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VETERINARY MEDICINE

July, 1931

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No. 7
VOL. XXVI

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Veterinary Medicine

VOL. XXVI JULY, 1931 NO. 7

Published Monthly by the Veterinary Magazine Corporation
75 East Wacker Drive, Chicago, Ill., U. S. A.
$4.00 a Year

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of Mar. 3, 1879.

Entered as second-class matter under the title of American Journal of Veterinary Medicine, July 19, 1910, at Chicago, Illinois, under Act of March 3, 1879.

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D. M. Campbell, Editor A. T. Kinsley, Associate Editor

Of 20 yearling foals presented for postmortem examination at the Kentucky Agricultural Experiment Station, all were found to be badly infested with nematode parasites.

In a study of sterility in mares, at the Kentucky Agricultural Experiment Station, *Bacterium viscosum equi* was isolated from over 50% of the foals examined. In searching to obtain evidence of the normal habitat of this organism it was found in the crypts of the tonsillar region of mares.

Beaudette of the New Jersey Agricultural Experiment Station found that a 1:10 dilution of 40% nicotine destroys chicken mites when sprayed on the feathers on the under side of the body of chickens.

Hadley, from an investigation in Wisconsin, concludes that while the appearance of milk cannot be taken as a guide to determine whether it is contaminated with streptococcus epidemicus, the strip cup, leucocyte counts, brom-cresol purple and other color indicators for the determination of pH value are valuable for this purpose, but that a bacteriologic examination of the milk is the only reliable means of diagnosis. Furthermore, it is justifiable to conclude that a very acute mastitis may be caused in cows by infection with the *Strept. epidemicus* of human origin.

It is estimated that there are now 4,500 work horses and 5,500 saddle horses in Philadelphia. The former have decreased 60% and the latter increased 60% in the past 20 years.

Dogs in North China are frequently infested with *Dirofilaria immitis*. The species of mosquito concerned in the transmission of this parasite is not known, but Feng Lan-Chou observed transmission by *Anopheles hyrcanus* and *Aedes koreicus*.

Milk, the newest and freshest food that we consume in some form every day, is at the same time the oldest known food. A milking scene has recently been discovered on the facade of the temple at Ur. Thus, 4,000 years B. C. milk was an important food of the Chaldeans.

Bleeker concludes as a result of experiments at the Arkansas Experiment Station, that if an agglutination titer for pullorum disease of 1:25 is used as the basis on which a flock is culled, a relatively large number of diseased birds remain as a menace to the health of the flock, and serve as a source of infection for chicks the following year. It is recommended that when the blood serum of a fowl agglutinates a suspension of *S. pullorum* organisms in a dilution of 1:10, it be considered a carrier of pullorum infection and be removed from the flock.

It seems reasonable to conclude that, until the time when we have efficient pasteurization of milk, frequent outbreaks of milk-borne epidemics may be expected.—Committee on Milk Production and Control.

If we may use milk supply control as an indication of sanitary development, health department practice in the small town is still in its infancy. The milk supply is little better in sanitary quality than it would have been if approved processes of pasteurization had never been discovered.—Committee on Milk Production and Control.

Those dairy cow cases in which the affected cows go down and are apparently normal in every way excepting they cannot get up, are occurring here and there. The cause of this condition has not been determined. Is it a manifestation of a deficiency? Boyd suggests a trial of calcium therapy.

Tick fever in cattle is not as prevalent as it was a few years ago; however, there are still numerous cases in some localities. The treatment of this malady is not always successful. African investigators have recommended the intravenous injection of from 50cc to 200cc of a 2% solution of trypan-blue. This treatment consists of only a single injection, is quite effective in the majority of cases.

Of approximately 10,500 veterinarians in active service in the United States nearly 1,400 are employed in the U. S. Bureau of Animal Industry.

One type of professional man, the veterinarian, is not finding his field overcrowded. This field is not likely to be overcrowded for some time because of the comparatively small number of students in veterinary colleges at present in contrast to a decade or more ago and because of the ever-widening field of service. At no time in our history have there been such pressing demands for veterinarians who have received advanced training in research and experimental work. —John R. Mohler.

With the enactment of the anti-cropping law last winter, New Jersey becomes the fourth state to prohibit cropping the ears of dogs. No cropped dogs will be permitted to be exhibited at a kennel show in New Jersey. Fines for violating the law grade up to $250.00.

Six thousand species of insects are on record as being of economic importance. Two of them, the cotton boll weevil and the cotton boll worm are responsible for a loss of about $270,000,000 a year. The total loss in the United States due to harmful insects is estimated at more than $900,000,000.

The nature of the metabolism of trypanosomes and its affect on the infected host is a subject of controversy. There are two opposing theories. One group of investigators maintains that the pathological changes are due to a toxin elaborated by the trypanosomes. The other attributes the results to a depletion of glucose and glycogen reserves.

According to laboratory findings, swine erysipelas is becoming more and more prevalent in swine in the corn belt. Thus, in one laboratory the causative microbe of swine erysipelas was isolated on three successive days from specimens submitted by practicing veterinarians in three different states. In one section of the country where this disease was identified four or five years ago, the acute type of the malady is becoming relatively common.

Not only is the life hazard of bottle-fed babies most favorably influenced by a pure and wholesome milk supply, but the average level of robust health of infant, child and adult as expressed in normal nutrition and vigorous resistance to disease, is enormously increased and promoted, for milk and milk products have become one of our most important and indispensable foods in the daily dietary of America.—Committee on Milk Production and Control.

Practicing Veterinarians and Case Records

By M. C. HALL, Washington, D. C.
President of the American Veterinary Medical Association

THE two outstanding things that the writer learned in a year's post-graduate work for an M. A. were: That what is printed in text books is not only not necessarily true, but that much of it is dependably false, unsound, inadequate or misleading; and that much more is not known about practically all subjects than is known about them. How the writer went through high school and college without learning these things is a mystery; possibly he was of a naturally confiding and trusting nature. It wasn't a lack of good teachers; two of his teachers, Dr. E. C. Schneider and Dr. Florian Cajori, were specimens of those rare geniuses in the pedagogical world, real teachers, and some others were good teachers. Doubtless some hints as to the inadequacy of text books must have been cast out by teachers occasionally, but evidently they didn't bear down sufficiently heavily on this item to make it register. Certainly no one ever took the trouble to show us what a world of unsolved problems lay on every hand.

It is unnecessary to issue a questionnaire to veterinarians to demonstrate that most of them issue from the veterinary colleges unconscious of the inadequacy of texts or of the limited total of the world's knowledge of veterinary science, and that most of them remain unconscious. It is only too evident that this is the case. The writer has preached for years that what we know of parasitology is less than 1 per cent of what we should know, and that this makes it an excellent field for research. There is evidence that this idea is being generally accepted. However, he has recently had evidence that some veterinarians think this is not true of other fields of veterinary science, so let's tell the rest of the story: It is equally true of other fields of veterinary science.

It would not be exaggerating to say that it is even more true of certain other fields. As an example: Research in anthelmintics has put much of that subject on a fairly sound basis. We know what drugs to use in certain cases, and we know the dosage, contraindications and various other things. There are more or less specific treatments, all of which will probably be improved on in the future, but nevertheless satisfactory specific treatments for zoological and clinical parasitisms. Of how many bacterial and virus diseases can we say as much? What research are veterinarians doing to develop rational therapeusis and specific medication for these diseases? For how many carrier and latent type of disease do we have satisfactory diagnostic methods, and what are we doing about it?

That only touches the surface of unknowns in veterinary medicine. What are the normals in anatomy as regards color, size, shape and location of organs? Where are our color standards for color of organs? What are normal blood pictures for our domesticated animals, and how were they established as normal? What have we on regional anatomy of our domesticated animals? Our ideas of physiology at any date are proved inaccurate and inadequate within a decade.

But, you may think, there is a dependable solid nucleus of established fact that has been known for many years, and this is the real basis for practice. The soundness of this knowledge may be doubted even more than our more sketchy recent knowledge. It is a good thing to assume that if a thing is generally believed and has been believed a long time, it is prob-

ably not true and the opposite is probably true. A flat earth is obviously flat; too obviously so, in fact. The writer was taught that you couldn't pass a catheter on a bull; was it Dean Wegener who showed that you could?

The student should not be allowed to go through college reading his text books with the eyes of faith or listening to his teachers as if to oracles. He should be taught a healthy skepticism that holds all teachings as something to scrutinize thoughtfully, to accept facts as such only when they are supported by adequate evidence, to accept all methods as things which undoubtedly could be improved, and to keep an open mind on all subjects, even his politics and his religion. We need not be afraid that this dangerous business of keeping an open mind will wreck his stability. The type of man who catches cold or gets a headache when he has an open mind will develop cerebral ossification at an early age, and only a hardy soul that will survive such exposure will keep an open mind; this latter is the type we should try to salvage.

Every faculty member should point out to students the limitations of our knowledge as exhibited by the inadequacy of texts, but more especially the professors who have to do with clinics should stress the fact that in private practice the veterinarian has a wonderful opportunity to contribute to our knowledge of the art and science of medicine by keeping and publishing accurate and comprehensive case reports, carefully tabulated and accurately interpreted. If a veterinarian, in practice, does not keep case reports it is difficult to see how he can function to advantage. Our case reports will be a written record of our mistakes, especially if they include necropsies following antemortem diagnosis, and almost nothing is so educational, where properly assimilated, as our mistakes. Case records give unity and continuity to our work; without them there is a scattering and disjointed effort. Human memory is too unreliable for the business of dealing with life, disease and death, and for his own sake the practitioner should fill out and consult carefully prepared forms, covering the many things that should go into diagnosis, treatment and results, rather than trust to memory and the impulse of the moment.

Such a method of practicing medicine with written case histories as a basis has the promise of the dignity of an art and a science. Without these records it may be a healing art, but it is unlikely to be a science, and not infrequently barely misses, if it does miss, sheer empiricism, not always of a high order.

The man who recognizes his obligations to his profession, who has really invested his intellectual and emotional capital to a large extent in his life work, will want to build some monument to himself in that field. He will want to extend the field of knowledge by giving to his associates and to the future new ideas, new facts, better methods, a better technic, an improved instrument, or a sounder organization. The practitioner could do much to add to our knowledge. He is not doing what he could, but perhaps he doesn't realize how little we know and how much he could do. Perhaps this has not been pointed out and emphasized; if so, we trust the schools will see to it that no student is left, hereafter, with any mistaken ideas on this subject.

Case reports should be comprehensive and accurate. Any given cases of methods of treatment should be contrasted with the checks of cases under no treatment or under a different treatment. Precision and accuracy should characterize the work. It is not intended to decry the publication of striking individual cases, but the most important thing is to have long series of checked cases from which conclusions as to the dependability of the results obtained may be drawn with some mathematical likelihood that the conclusions are sound and will follow as a rule. Veterinary students should be given assignments in the school hospital in which

two methods of handling cases of certain sorts are used, and the results recorded and compared; when the results seem worthy of publication, the faculty should encourage this. Some of the early efforts of this sort will not be of great value, but here again we learn from our mistakes, and the publication of mistakes has a salutary and chastening effect which leads to improvement in the right sort of persons. For the benefit of the reading veterinarian we must depend on the editors to reject the obviously unsound and worthless, but with this protection we should encourage students and practitioners to keep, study, interpret and publish case reports, preferably as carefully checked series and as extensive as possible.

Dr. Oscar Riddle of the Carnegie Institute, predicts that man will soon be able to add several inches to his height by the use of a pituitary gland hormone.

Periodically, Buffalo gnats, *Simulium pecuarum,* occur in such swarms in the Mississippi delta that they cause the death of many animals. Last spring, more than 200 mules were killed in two counties in Mississippi by these vicious little humpbacked blood-sucking flies.

Ll. E. W. Bevan, M. R. C. V. S., Director of Veterinary Research, Southern Rhodesia, Africa, was the first to report a case of undulant fever in man due to *Br. abortus* of bovine origin. The report was made at a meeting of the Southern Rhodesia Veterinary Association, November 12, 1921 and was published in the Transactions of the Royal Society of Tropical Medicine and Hygiene, January 19, 1922. Keefer, who discovered a case of undulant fever due to the *Br. abortus* at the Johns Hopkins Hospital in 1922 and reported it in 1924, is usually credited with having been the first to report the pathogenicity of *Br. abortus* for man. The credit belongs to a veterinarian and should be accorded to him.

Polo was played almost 2,000 years ago by Nomad horsemen in Central Asia.—*Science.*

Fur manufacturing contributes about $300,000,000 annually to the wealth of the United States. It engages the services of 150,000 workers. The industry is facing trying times, being greatly affected by the general business depression.

Park and others have shown that milk of high bacterial count, even when pasteurized, is not a wholesome food for infant feeding. Pasteurization is therefore not a substitute for clean and sanitary milk production.

Milk is an almost complete food. Its proteins are of high quality, its fat is one of the few food fats containing Vitamine A, the element that cereals, meats, eggs, roots, tubers and fruits are deficient in. The most striking deficiencies of milk are iron and copper.

Municipal milk control measures should include supervision of the inspection of farms and plants, physical examination and testing of cows, laboratory examination of milk, physical examination of workers and residents at farms and plants, including laboratory examination of body discharges, and pasteurization control.—Committee on Milk Production and Control.

Increased alkalinity of the blood is constant in cancer patients, according to McDonald, director of cancer research at the University of Pennsylvania, Graduate School of Medicine. It has been found that the degree of alkalinity of the blood is a fair index of the duration of the life of the patient. It has been suggested that the excess alkalinity of the blood in some way results in exaggerated cancer cell multiplication in the same way that by increasing the alkalinity of sea-water, the rate of multiplication of marine eggs is increased. This finding is of importance, and may serve as the basis for the successful treatment of cancer.—*Science* 75—1879.

Reflections on the Diseases of the Newborn*

By L. VAN ES, Lincoln, Nebraska
Professor of Animal Pathology and Hygiene, University of Nebraska

THE term "new-born" is commonly applied to animals within the age group contained between the time of birth and the period when the healing of the umbilicus has been completed. This length of time normally ranges between 7 and 12 days, and while it must be regarded as one of the most hazardous to the young animal, it seems to be fitting to extend it when consideration must be given to the disorders more or less peculiar to young animals.

These economically very important diseases are most common in juvenile animals in process of adjusting themselves to the environment in which the fateful event of birth placed them. They may be more adequately designated as "juvenile disease" and their limitation to certain age groups cannot be very clearly defined. In fact, the foundation of juvenile disease may be established during pre-natal existence, while their sequela may persist through adolescence and the more remote life periods.

While usage warrants the retention of the term new-born, this discussion will pertain to certain aspects of disorders more or less peculiar to animals within the age group which extends from birth to the period when adjustment to environment may be regarded as having been fully established. Arbitrarily, it may be said to have been established by any farm animal in a state of unimpaired health of the age of four months.

For the young animal, the first days of post-natal life and the hazards which accompany it during that time are the most critical part of its juvenile period. But even so, health risks peculiar to this age group will continue to present a problem for some time after the more narrowly defined new-born phase of life has been safely completed.

In the opinion of the writer, any solution of the problem presented by the juvenile diseases can be most logically approached by inquiry into the factors which may be etiologically fundamental.

In this connection it must be recognized that the group of diseases here considered are particularly associated with conditions imposed by domestication. The type of animals most involved in the disorders of youth must manage to exist in environments where the ecologic relations to which their wild or semi-domesticated ancestors were more or less perfectly adapted, cannot be maintained.

Their place of abode is generally fixed and often extremely circumscribed; their food is chosen by man, more with regard to its economic value or expediency than to its physiologic fitness. The natural mode of life is largely abandoned. By shelter, the animals are removed from influences which promote health and vigor, and even the admirable genetic equipment by which species so stubbornly survive in a state of nature has in the man-directed selective breeding been largely thrown overboard for the sake of profit or pleasure.

Under the operation of such influences, diseases become possible, which in a state of natural existence would but rarely constitute a menace to a given animal population. In a general way it is the task of hygiene to provide artificial means compensatory to faulty or disturbed ecologic relations, and in the case of the juvenile diseases this is probably far more imperative than it is in the maintenance of the health and well-being of adults.

The factors which in a direct manner actually cause disease or which merely make it possible may be intrinsic or extrinsic in character, operating separately or in combination.

*Presented at the Eleventh International Veterinary Congress, London, August 4-9, 1930.

The intrinsic factors are entirely associated with the status of any normal mammal at birth. At the threshold of post-natal life, the young, hitherto of purely parasitic antecedents, must face an environment which under the conditions imposed by domestication is filled with dangers to meet which it is not adequately prepared.

In order to meet its nutriment requirements it must for some time continue to depend on what the maternal body has to yield for this purpose. The young organism is yet to be equipped with the biochemical defenses against microbic or parasitic invasions, the agents of which being part and parcel of the environment to which it must become adapted.

The new-born may be in possession of a genotypic insusceptibility to certain microbic diseases, but certain observations notwithstanding, the fetus *in utero* does not appear to participate in the protective substances by which the maternal body defends itself. The young of our domesticated species are born with a virgin vulnerability to most infections to which the species *per se* is liable, while, in addition to this, vulnerability also exists in regard to microbic invaders which ordinarily exercise no pathogenic qualities.

Harmless microparasites of adults may destroy their offspring because they invade in stupendous numbers or merely because the body invaded is without the physical or biochemical means to resist such incursions. In some outbreaks of new-born disease (colibacillosis) the impression of an observer is that to the microbic invader concerned the young animal occupies about the same relation as the dead do to the saprophytic causes of decay.

The structure of the neonatal intestine is an open one, at the same time permeable to microbic invaders and to the protective substances which the mother yields to its young by means of the colostrum and later mammary secretions. It is from this source and from none other that the new-born receives a measure of passive immunity upon which it can eventually erect its own active defensive mechanism.

If this passive protection can be established before a noxious microbic invasion takes place, the development of the young animal concerned may proceed uninterrupted by disease. If, on the other hand, a massive microbic assault and maternal passive defense simultaneously assert themselves the final outcome is in the balance, and if by constitutional or mammary disease the protective substances are below normal potency or are themselves the vehicle of pathogenic microbes, the continuation of life is in serious jeopardy.

The extrinsic causes of diseases of juvenile animals or the external influences which favor their occurrence are to be found in the environment, applying this term in its widest sense.

Environmental influences tending to promote pathologic conditions may exert themselves during pre-natal life, but are most certainly potent during the earlier post-natal period, when young animals are in intimate contact with older ones or when food and drink may be polluted with the microbic agents of disease.

Shelter, with its elimination of the ultra-violet portion of the solar spectrum and its faulty atmosphere also challenges the fitness to survive.

The environmental factors which we have to reckon with as having an etiologic relation to juvenile diseases may be of maternal, physico-chemical or microbiologic origin.

Maternal, or rather intra-uterine, factors are associated with such biologic forms as embryo or fetus may encounter in the uterus. Some of these microbic factors may be highly virulent for the fetus and destroy it before the expiration of the gestation period permits the young to escape from its dangerous environment. Infection by the Bang bacillus is the most conspicuous example of a purely fetal disease.

Or, micro-organisms of various sorts which the maternal animal acquired at some time may be localized in the uterus, there to menace the fetus or later to cause mischief in the new-born. There is a considerable volume of opinion that various infections, destructive to young life, may be acquired as a result of intra-uterine exposure.

It is not inconceivable that certain micro-organisms may become permanently established in animals which obtained them early in life in the course of a microbic assault which failed to destroy them.

Inadequate fetal nutrition must also be accepted among the factors having to do with health impairment during the earlier phases of post-natal life. The birth of undernourished young is not an uncommon phenomenon and that such a state of subnutrition may be prejudicial to health must be admitted.

While there is probably no evidence to show that animals are born with rickets, there is at least ground for the suspicion that in a species so liable to rickets as swine a maternal animal in which the calcium-phosphorus intake or assimilation is defective, may not be without influence in the causation of the disease in her offspring.

Physico-chemical environmental influences affecting the morbidity of young animals vary greatly in character and only the more potent ones can here be considered.

The food of the young animal and the state of nutrition in which the latter can be maintained are most important factors, not only from the point of view of the producer, but likewise from that of the sanitarian, especially because of its relation to general morbidity.

Food must be selected not only with its physiologic fitness in mind, but also with due regard to its potentiality as a vehicle for infection. The normal mother's milk, including the colostrum, is the ideal food for young animals, and will ever remain so. It should be supplied in adequate quantity and quality, and the nursing animal should be fed with this in mind. If the milk is not normal it must be rejected, and if exposed to contamination it should at least be pasteurized.

The fresher the milk the better, as old milk may prove to be a hazardous food. Humanity has sorrowfully learned that baby tombstones are commonly also monuments to bad milk. The animal nursling is as sensitive to bad milk as the human one, and to overlook this fact may prove to be a costly mistake.

When supplementary or other food has to be provided it should be selected with a view to its nutrient qualities. It must contain a balanced proportion of organic food substances and be not lacking in the mineral ingredients required by the growing young or in the various vitamines upon which normal development may be dependent.

Cold, wet, and poorly-ventilated stables are always detrimental to the new-born. In some manner, not yet understood, these factors play a part in the etiology of the respiratory diseases of early age. Cold concrete floors without some insulating covering, or an abundance of bedding, and naked stone walls, have proven to be deleterious to young animals, especially to those which are being reared separated from the adults, and thus unable to profit by the warmth supplied by the latter.

The lack of direct solar radiation incidental to indoor life or to the winter season may be particularly harmful to young swine owing to the latter's liability to rickets. Even older swine will develop osteomalacia in an enviroment of the type mentioned. Only to a less degree the same factors may prove to be damaging to the new-born of other animal species.

Rickets, as well as associated spasmophilia (tetany) are the direct result of the failure to be sufficiently exposed to the ultra-violet component of the solar spectrum. Because rickets is not always accompanied by conspicuous macroscopic bone lesions and deformities, and because many cases of incipient rickets, without manifest clinical symptoms, recover after the animals are placed in a more suitable environment, the disease and its complications may not have been fully recognized as an important factor of morbidity within the new-born and juvenile age periods.

The writer's observations in an area with a dense swine population, where pigs are often farrowed at an unreasonably early period, tend to show that rickets is not only a costly disease *per se*, but that it must be looked upon as a disturbance particularly conducive to other morbid processes and inter-current infections.

The biologic factors associated with environment may include the ones which always exercise a pathogenic influence, whether they are introduced into the body of an adult or in that of a juvenile animal. It is not with these that we have to reckon in this report.

We are more concerned with a group of micro-organisms, parasitic or facultatively so, which only under special circumstances may either cause disease *per se,* or do so in co-operation with other noxious factors. They include such bacterial species as B. coli, partyphi, suipestifer, pyogenes, bipolaris, diplococci, streptococci, staphylococci, and others, while intestinal helminths and protozoa make up the remainder.

That such elements may become dangerous to animals within the new-born and juvenile groups must be attributed to their concentration in the environment where the event of birth left them and the unpreparedness on the part of the defensive powers of the animals concerned. There has not yet been time to safely acquire an active immunity, and the passive one conferred by the maternal mammary secretions may have been too tardy or not sufficiently potent to withstand an overpowering assault. The microbic flora and fauna of an environment are largely derived from the body wastes of its animal inhabitants, and no animal population can maintain itself without an extraordinary hazard of disease when in contact with such materials. This hazard, already a very positive menace to adults, is infinitely more so to the as yet poorly protected new-born or juvenile animal.

If we add to such a situation the vigor depreciating influences of low temperatures, wet enclosures, improper or inadequate feeding, the lack of solar radiation, we must wonder, not at the prevalence of new-born and juvenile diseases, but at the number of animals that actually manage to attain the adult stage.

Correctives, applicable to the problem presented by diseases of young animals, may be divided into two groups, namely: immunologic procedures and hygienic measures. The former are much applied and the latter are mentioned.

Attempts at immunization, actively or passively, against such diseases as bronchitis, pneumonia, dysentery, pig typhus, polyarthritis, and many others, more ill-defined pathologic complexes in young animals have more or less constantly resulted in disappointment.

The multiplicity of microbic species that are or may be implicated, and the uncertainty of their antigenic values, are by no means conducive to a successful immunization and certainly not when this must be undertaken when an outbreak of juvenile disease is already in full swing.

In some cases the use of immune sera has apparently been helpful and should be further encouraged. On the whole, however, the control of the diseases of the newborn by immunization is based upon assumption, and as long as these are what we have to resort to, the guess that the maternal blood is the best agent to use is probably based on a sounder foundation and logic than the one which pertains to the immunizing substances offered by commerce. This is apt to be particularly true when the blood donor had inhabited a contaminated environment for an extensive period.

Further investigations for the purpose of improving any potential usefulness of immunological methods applicable to juvenile diseases should be stimulated and sustained, even if there is some awakening to the fact that the solution of the problem will ultimately depend on environmental amelioration.

The latter must include the removal of the adverse factors already alluded to. The hygienic measures indicated may be general or special. Among the general measures we must mention those which make the contact of the highly vulnerable new-born with a grossly befouled stable, yard or pen impossible or at least very improbable.

In the designing of such general measures we must also reckon with the ill effects of food and water contaminations, and with the deleterious influence of prolonged indoor

life. Consideration must also be given to the unhygienic practice of having the young born during a season which compels a sheltered existence, when green forage is not available and during which radiant energy is at its lowest ebb.

The correctives of a more special character belong to the hygienic measures of obstetrical practice. They include the establishment of a maximum degree of cleanliness of the surroundings of the parturient animal and of the latter herself. If any aid is to be given her, or if an exploration of the fetal position is required, this must be done with all caution regarding the prevention of the introduction of septic materials.

Meddling by an untrained personnel should be discouraged, and especially so if a hazard of specific infection is known to exist. As a matter of routine practice, the stump of the cord and the region of the navel should be disinfected. In the case of manifestly infected stables, the latter should be abandoned by animals in the preparturient and parturient state and, if need be, preference to be given to the pasture as a place for the young to be born in.

The new-born should be permitted to feed on the colostrum and in default of the latter could receive a quantity of the maternal blood serum mixed with milk. In regard to milk, only that derived from an absolutely normal mammary apparatus should be used, and then only while it is in a perfectly fresh condition.

The mammary region, including the teats, should be scrupulously cleansed before the young animal be permitted to suck. In the face of existing infection risks, the new-born should be so placed that the ingestion of extraneous materials becomes impossible. In accordance with the nature of the young, the use of muzzles may be found to be practicable and useful in this connection.

When supplementary feeding becomes necessary or desirable as well as after the weaning of the young, its food must be selected with a view to its nutritional requirement with due regard to mineral and vitamine ingredients. Special care should be taken to exclude from it any pathogenic or toxogenic contaminations.

Young animals must not be kept indoors for too long a period unless this can be combined with direct solar irradiation. In young pigs particularly, rickets and spasmophilia (tetany) are apt to become manifest if they were not sufficiently exposed to radiation during the first two weeks of life. If, for any reason, exposure to unfiltered sunlight is not possible, recourse must be had to the administration of cod liver oil. In the young of animals other than swine, the problem of rickets may not be as pressing though constantly to be considered. Rickets, as a base for further mischief, must not be underestimated.

Based upon the above considerations, the writer concludes that while advantage must be taken of any immunological method of apparent worth, the solution of the problem presented by diseases peculiar to the new-born and to juvenile animals must be found in hygienic measures which either restore normal ecologic relations between animals under domestication and their environment or which may serve as substitutes for the protection enjoyed by animals in the wild state.

It is not enough that veterinary practitioners and livestock sanitary officers should be guided by hygienic principles, but the breeder and farmer also must be shown that in that direction the solution of the problem connected with young animals must be sought for.

In countries where this type of disease has already become or is becoming a major problem, forces should be set at work to carry knowledge and understanding of the basic factors which operate to the disadvantage of the livestock growers to every rural community.

To a large extent the prevention of the diseases of the new-born is a matter of environmental amelioration, and breeders should not be left in ignorance of this fact. To instruct as much as to cure is indeed the task of the present day veterinarian.

THE USE OF THE TROCAR IN CATTLE*

We do not resort to the use of the trocar for bloat in cattle so frequently as we used to do. The insertion of the trocar and the canula into the rumen in the cow is not always a wholly innocuous procedure and the necessity for it can often be avoided by the use of the stomach tube. Since we usually have to use the stomach tube anyhow to remove the cause of the bloating, unless the emergency be great, such as imminent suffocation of the animal, or a large number affected by bloat simultaneously, it is usually best to pass the stomach tube and remove the contents of the rumen, both gaseous and liquid, in this way.

However, there are occasions when one will want to insert the canula in bloat in cattle. In such cases, we insert the trocar and canula first through a piece of heavy rubber, such as the inner tube of an automobile tire. The rubber should be large enough to give good anchorage for the canula, say about 6x9 inches in size. This rubber can be fixed to the skin by means of adhesive tape and it will go far to prevent the canula working out of the rumen and permitting the escape of rumen contents into the peritoneal cavity.

One should not forget that soon after the cause of the bloat is removed, the animal will probably resume ruminating and muscular contractions of the rumen will commence. The movement of the rumen in the ox is quite considerable, and is frequently sufficient to work out the canula if it is not anchored in some way.

Another important thing in the use of the trocar is not to remove the canula too early. I always permit it to remain *in situ* for twenty-four hours. This gives an opportunity for adhesions to occur between the rumen and the abdominal wall around the puncture.

When the canula is withdrawn these adhesions prevent the escape of rumen contents into the peritoneal cavity.

A veterinarian can get in awful bad with the dairyman by having a great abscess develop at the point where he has inserted the trocar, or by losing animals from peritonitis following the use of the trocar.

*Notes from an address by T. H. Ferguson, Lake Geneva, Wisconsin, at the Eighth Annual Short Course for Graduate Veterinarians, Alabama Polytechnic Institute, Auburn, February 2-7, 1931.

COLIC IN CATTLE*

Colic in cattle is similar to the same ailment in horses, and the symptoms are somewhat the same. The animals kick at the abdomen, lie down, get up, stretch out and exhibit all the symptoms of abdominal pain. Colic in cattle is due to intestinal catarrh, intestinal stasis and volvulus. It is usually chargeable to the character of the feed the animals have been given and is amenable to treatment.

Foreign bodies are responsible for acute abdominal pain and the animals sometimes exhibit a sort of colic, but in these cases there is a disinclination to move, the moving occasioning the animal greater pain than she experiences while the affected part is held rigid.

Intussusception in cattle, except intussusception of the cecum, is easily diagnosed by examination through the rectum.

In the treatment of colic we should use an anti-ferment, an oleaginous cathartic, and if the pain is great an anodine, and of course, pump liberal quantities of water into the rumen. This applies to every intestinal ailment in cattle. There is scarcely any ailment or affection of the digestive apparatus in that animal that is not improved by pumping liberal quantities of water into the rumen and massaging it to mix its contents with the water. Even in acute bloat this is essential procedure unless the interference with respiration is so great as to require immediate tapping.

Volvulus when diagnosed must be relieved—treated as soon as the pain is relieved. A ten-inch incision should be made in the abdominal wall. Recent cases of volvulus can usually be relieved by manipulation of the involved intestine. Where the condition has existed for several hours and firm adhesions have developed, it is necessary to excise the affected portion of the bowel and a triangular section of the mesentery.

Clinic at Missouri Veterinary Short Course*

Entropion in a Chow

Subject.—Chow, four and one-half months of age.

Clinician.—J. C. Flynn.

This puppy was suffering from a slight degree of entropion in the left eye. The eye was held partially closed and showing epiphora. The clinician stated that the case might recover from treatment, without operation, and suggested the use of argyrol ointment and keeping the animal in subdued light for two weeks. It is important that it be kept out of bright light since in the present highly sensitive condition of the eye, bright light tended to cause squinting and this in turn increased the infolding of the margin of the eye lid and aggravated the entropion.

If the animal failed to respond to this treatment within a couple of weeks, the clinician advised that the eyelids be operated upon, stating that the incision should be made crescent shaped, surrounding the outer canthus of the eye, so as to remove a portion of both the upper lid and the lower lid, and draw the outer canthus latterly.

Formerly the operation was confined to one or both eyelids and nothing was done to draw the outer canthus away from the median line. It is much better to pull the canthus latterly however. In fact, in some cases this will correct the condition without the removal of surplus tissue from the lids.

In performing this operation, it is essential to remove just the right amount of skin. If too little is removed, the infolding of the lids will not be corrected. If too much is removed, the mucus membrane of the lids will be exposed to view and the animal rendered somewhat unsightly, a condition—ectropion—considerably more difficult to correct than the present condition.

The operation is usually performed by picking up a section of the skin of the eye lids with the forceps until the right amount is ascertained, and the point marked by passing a needle through. When this has been carried out throughout the length of the incision, the surplus skin is clipped off with scissors or removed with a scalpel and the wound sutured. Careful asepsis is necessary to avoid the formation of scar tissue and probable injury to the eye ball.

Local anesthesia is sufficient for this operation.

Tail Overgrown

Subject.—Boston terrier, three months old.

Clinician.—J. C. Flynn.

The puppy's tail did not extend beyond the body, but the outline of it could be seen and felt lying beneath the skin of the rump. The clinician stated that this condition is by no means uncommon in Bostons. Efforts of the breeders to get a short screw tail have resulted in such cases, in getting less tail than is wanted.

The operation consisted in dissecting out the tail; leaving on it as much covering of skin as possible. The operation was not very hopeful. Cases in which the overgrowth was less than this one sometimes recover, but in this case the prognosis was unfavorable.

However, the irritation of the tissues produced by the curled in tail was such as to cause itching and rubbing and rendered the dog unsatisfactory in its present condition. Therefore, after explaining such cases to the owner, such operations may be undertaken, with the understanding that if we are not successful in getting a skin-covered tail, the appendage could be amputated, making the dog more comfortable and no worse off so far as appearance goes than it was before treatment was undertaken.

*Notes from the clinic at the Special Course for Graduate Veterinarians given under the direction of Department of Veterinary Science, University of Missouri in cooperation with the Missouri Veterinary Medical Association Columbia, January 20-23, 1931.

Distemper-Chorea

Subject.—Boston terrier, about six months of age.

Clinician.—J. C. Flynn.

The patient had a marked chorea, but the owner stated that it had not had distemper. The clinician held that chorea in the dog is always the result of distemper, which may be, as in this case, mild and unnoticed, or if noted not recognized as distemper by the owner. However, if such dogs had been carefully watched, it would have been noted that such animals had a nasal and bronchial discharge before the onset of chorea. Such cases were as capable of communicating distemper to other dogs as animals having the disease in its worst form.

The clinician pointed out that such dogs ought not to be brought to a public clinic, since animals suffering from this type of distemper remain infective for a considerable period, probably about seven weeks from the onset of the disease. The mild type of the disease he believed to be due to the resistance of the animal and not to a low form of virulence.

On further examination, it was noted that the gums in this puppy bled on slight pressure and it evidenced other symptoms of distemper. It was removed without treatment and the clinic interrupted while the table on which the dogs were examined was disinfected, as was also the clinician's hands and the hands of his assistant. It was requested that no more dogs having any symptoms of distemper be admitted to the clinic, or brought into the clinic amphitheatre.

Cataract

Subject.—Fox hound, one year old.

Clinician.—J. C. Flynn.

This dog had a history of having had distemper some little time ago, which had completely cleared up. The clinician stated that cataracts in both eyes were undoubtedly a result of the attack of distemper; and further that in a hunting dog the condition was serious since one could not hope to remove the cataract and restore the vision. Vision could be restored after the cataract was removed, by the use of glasses, but that was somewhat impractical for a hunting dog.

He stated that in a house dog, blindness was by no means serious, since the dog's principal special sense is the sense of smell, and following that, hearing, sight being easily third in importance. House dogs operated on for cataract were blind, but their eyes had a good appearance and they got along well if the senses of smell and hearing were unimpaired.

The cataract operation is one to be recommended in the case of a house dog, but is practically useless for a sporting dog.

Skin Infection

Subject.—Large blood hound.

Clinician.—J. C. Flynn.

This blood hound was the property of the police department. It had a small bare spot about the size of a 25-cent coin in the center of the back. The area did not cause the animal any inconvenience. There was no pruritis. The dog was brought to the clinic because a mate that had a similar spot on the back had died very suddenly from what was diagnosed on post-mortem examination as acute nephritis.

The clinician stated that in his opinion the alopecia had no connection with the nephritis. A microscopic examination revealed no parasites. The trouble was probably due to infection. Five kennel mates were said to be in a similar condition.

Spaying

Subject.—Chow, six months old.

Clinician.—J. C. Flynn.

This operation was performed to demonstrate the sutureless operation for spaying bitches. Doctor Flynn stated that in performing this operation it was well to make sure that the bladder was empty, since otherwise it might be punctured. However, even if the bladder were punctured, it was not necessarily serious as it would ordinarily heal without treatment, but it was not good surgery to puncture it.

After cleaning, shaving and disinfecting the area, an incision about three-eighths of an inch long was made in the median line in the skin about one-and-one-half inches posterior to the umbilicus. Thumb forceps were placed in the incision and pushed about one-

half inch to one side of the median line and there pushed through abdominal wall into the peritoneal cavity.

From that time until the operation was completed, either some instrument or some portion of the abdominal viscera was kept always in the opening, since otherwise it might be difficult to relocate the opening.

After the opening was made into the peritoneal cavity, artery forceps were passed in as the thumb forceps were withdrawn, and one horn of the uterus was picked up and brought to the exterior through the wound. This was followed down until the ovary was brought out and removed. The first horn was then returned to the abdominal cavity and the second brought to the exterior and the ovary pulled out and removed, and the horn returned to the abdominal cavity.

The wound does not require suturing since the small wound in the abdominal wall and in the skin do not match. Such animals do well without any dressing, but the clinician thinks it well to place a bandage around the abdomen and leave it in position for 24 hours. No further treatment is given.

In old animals where the horns of the uterus and the ovaries are large, a longer incision in the skin is necessary and in such cases it is well to take one stitch in the skin wound. The opening through the abdominal wall needs no suturing even in the older animals because no tissues are cut. The fibers being spread apart go back into place when the instruments and abdominal viscera are removed from the opening.

Ether anesthesia was used for the operation; the anesthesia being at no time profound. The patient was permitted to revive as the operation was completed.

Incomplete Decapitation

Subject.—Large Angora cat, mature.

Clinician.—J. C. Flynn.

In this cat the trachea was completely and the esophagus partly severed just posterior to the angles of the rami mandibulae. It could swallow food taken into the mouth, but when vomition occurred the vomitus was discharged through the wound in the neck. Breathing was wholly through the artificial opening into the trachea.

The wound was the result of a rubber band around the neck which had not been discovered until this injury was done. The present condition had existed for a year. The clinician stated that the cat would probably live out its natural life span so far as this wound was concerned. He stated that an operation to reunite the trachea and the esophagus offered great difficulty and that the outcome would be doubtful. He advised letting the animal remain as it is; the owner agreed.

Deep Abscess on the Head

Subject.—Boston terrier.

Clinician.—J. C. Flynn.

This dog was presented with a history that the day before it was noted to suddenly cry out with pain and hold the head to one side. At the time, it was playing around in a room where quilting was in progress and it was assumed that the animal had picked up a needle or pin and attempted to swallow it.

An examination showed the conjunctiva of the right eye considerably injected and some edema under the right lower eye lid. There was also a small wound in the gum just medial to the upper molars on the right side. Some distress was shown when the mouth was opened. The head was held to one side and jerked from time to time. On careful palpation some swelling could be detected on the right side of the head.

The diagnosis was that the trouble was due to a traumatism, the probability being that the animal had been struck a heavy blow on the head a day or two before it was noticed to be ailing. The prognosis was that a large abscess would develop in or under the muscles on the side of the head. It was stated that such an abscess should be opened from the inside, near the angle of the jaw, that they did much better when so opened than when opened from the outside, and of course, left no visible scar. Hot applications, preferably of antiphlogistene, were prescribed until fluctuation appeared.

It was deemed unlikely that the experience of the dog under the quilting frame had any connection with its present condition.

Loss of Voice

Subject.—Coon hound; male.

Clinician.—J. C. Flynn.

This animal, apparently healthy, was presented with a history that some weeks previously he had lost his voice. The clinician stated that this was a fairly common occurrence in hunting dogs, and, although the matter might not appear to the uninitiated to be serious, it was a very serious matter for the owner, who ordinarily took a great pride in the bell-like tone of his hounds, particularly the leader of the pack, in hunting at night. Hunting at night without the music of the hounds, the clinician could say from experience, was not to be compared with hunting when one had the music.

It was stated that where this loss of voice occurred with no evidence of a laryngitis, that it was usually due to atrophy of the vocal cords and was apparently incurable. However, there were cases that occurred as a result of a sort of vegetative growth on the cords and from edema of the cords where no active inflammation was apparent that sometimes responded to time and treatment.

The thing to do when presented with a case of this kind was to first make a careful examination of the interior of the larynx. For this purpose and to be in a position to give such treatment as the case might indicate, it was desirable that the animal be under general anesthesia. A bronchoscope with an electric light should be used for making the examination.

Castration in the Cat

Subject.—Angora tomcat.

Clinician.—J. C. Flynn.

This was a demonstration to show the advantages of the operator's method of castrating the male cat without restraint. The cat was stood upon an operating table and gently stroked until it was quiet. Then an assistant, with the fingers under the chin, raised the head somewhat, and rather rapidly scratched the throat and under jaw to attract the animal's attention.

When the cat's attention was entirely diverted, the clinician, holding the scrotum in his left hand, above the testicles, quickly incised it on both sides, pressed out the testicles, and, catching both at once in his right hand, jerked them free, the operation probably taking two seconds.

The patient took no note of the operation other than to make a single squawk when the testicles were pulled away, and showed no inclination to leave the table, or to fight, or other resentment.

Indigestion in a Cat

Subject.—Long haired neuter cat, nondescript breeding, about three years old.

Clinician.—J. C. Flynn.

This cat was not particularly ill but had a poor appetite, was thin, anemic and annoyed its owner by vomiting occasionally. It had been given santonin treatment three weeks previously. No definite diagnosis could be made from clinical examination and a microscopic examination of the feces revealed no parasite eggs.

It was stated that the trouble might be due to a hair ball, that long haired cats were quite subject to indigestion as a result of licking off the hair and swallowing it, which in time accumulated in the stomach and produced just the condition observable in this animal.

A hair-ball is difficult to diagnose by palpation since it is soft and feels like normal intestinal contents; nor does an X-ray reveal it. An oil cathartic and a tonic consisting of iron, quinine, strychnine and nuclein was prescribed. It was stated that the tonic should be given twice daily and that the dose of strychnine should not exceed 1/250th of a grain.

Crooked Tail in a Dog

Subject.—Chow six months old.

Clinician.—J. C. Flynn.

This animal had a short tail with an abrupt, lateral kink in it. The tail was not held over the back but drawn down behind the animal and to one side.

The tail was shaved and disinfected and the muscles, tendons and fibrous tissue were divided subcutaneously in several places and the tail shaped to the proper position for the chow tail, and splinted and confined there with adhesive tape.

The clinician stated that the bandage

should be removed and the tail examined in twenty-four hours and perhaps again two days later, but it should be held up over the body for a period of two or three weeks when it would probably stay in that position without restraint.

It was stated that while this animal would never have the large tail typical for the breed, that its appearance would probably be greatly improved as a result of the operation.

Modified Blood Transfusion in a Dog

Subjects.—Two large fox hounds.

Demonstrator.—Ashe Lockhart.

Blood transfusion is of more value in the practice of medicine than most of us realize. Many times we hear of blood transfusion being resorted to in the case of prominent persons, where it is used very late in desperate illnesses that in themselves constitute items of news value because of the prominence of the persons affected, and where in such cases the termination is often death. For this reason the uninitiated comes to look upon blood transfusion as being a last resort and one that is followed in the great majority of cases by death. Its routine use in hospitals, and it is routinely used in many hospitals, is seldom heard of by the general public.

Blood transfusion in the dog offers no serious difficulty to the skilled veterinarian and I believe there are conditions where it has a distinct value and where nothing else will replace it. I have in mind an outbreak of severe parasitism in a valuable pack of about 40 fox hounds. All were in bad condition and one or two of these animals had died. The local veterinarian was called and readily diagnosed the condition. The animals were so weak from the effects of hook worm infestation that he deemed it unsafe to give them an anthelmintic.

Three were selected for trial and promptly died from the effects of the anthelmintic. I was telephoned concerning the case and asked that a couple of animals be shipped to the laboratory for examination. They arrived the next morning wholly unable to stand and apparently not much more than alive. It appeared certain that they must die of their parasitism within two or three days at longest.

Both animals were given a blood transfusion of 10cc of blood for each pound weight. The following day they were up and about and anxious for food. They were given anthelmintic medication with the usual results in such cases where the animals live. They showed immediate improvement and went on to recovery.

The same procedure was then followed in the other animals in the pack, except that it was deemed necessary to give blood transfusions in only a dozen of the weaker animals. The results were entirely successful.

I have seen equally satisfactory results in other cases of desperate illness and accidents. The effect of blood transfusion, however, is not of permanent value unless the cause of the ailment can be removed, or the general condition of the animal improved while the stimulation resulting from the blood transfusion lasts, which is only three or four days.

For example, an animal far gone with distemper can be "pepped up" remarkably for two or three days by blood transfusion, but unless it can in the meantime get the better of the disease, a relapse will occur and end will be the same, only delayed a few days.

The results from blood transfusions are for superior to the results from the injection of normal horse serum or a defibrinated dog serum or other hypodermic or intraperitoneal injections of whole blood. The advantage to the animal in the use of blood transfusion is making available the blood cells and this can be done only if the cells are not injured, which of course, requires that the blood be injected promptly in the donee, before the red cells are injured, and of course, that it be injected directly into the blood stream. If it be injected subcutaneously or intraperitoneally the value of the cells is lost.

The technic is not difficult, but as getting the needle into the vein of the dog, particularly maintaining it *in situ* requires care, it is essential that both animals be confined. This can be attained by strapping them firmly to a table.

Transfusion cannot be performed in the dog as it can in the horse, cow or hog by withdrawing the blood into a large syringe and reinjecting it immediately, because as is well known the blood of the dog coagulates very quickly, much faster than that of the horse or of the cow. It is necessary to use an anti-coagulant. For this purpose sodium oxylate is as satisfactory as any. A 4% solution is used, and 1cc of the sodium oxylate solution should be put in the container for each 25cc of blood that it is expected to draw. This is the very minimum amount and it is customary to add 50% to it as a margin of safety. However, this additional amount should not be exceeded.

For example, if 250cc of blood is to be drawn, 10cc of a 4% solution is the minimum amount that can be depended upon to prevent coagulation in this amount of blood for the necessary time, and 15cc of the 4% sodium oxylate solution, but not more, is the amount usually employed.

A small trocar, about 12-14 gauge, is inserted into the heart of the donor because this is the easiest way in which to draw blood from a dog, and does not harm the animal if it is done properly. The trocar is inserted between the ninth and the tenth rib counting forward from the last rib, and near to the distal tuberosity. A trocar four inches long should be used in a dog of average size and it should be directed slightly forward and upward. If the trocar enters the heart muscle high up in the heart the animal will bleed to death.

The blood is withdrawn into a jar of the sort used in intravenous medication and when a sufficient quantity has been obtained, the trocar is removed and the apparatus connected up with a hypodermic needle (16-gauge) inserted into the external saphenic vein where it crosses from the anterior to posterior border of the leg. It is necessary, of course, to get the needle into the vein and to keep it there.

Dr. Dudley Jackson of San Antonio, Texas, has done considerable work in typing the blood of dogs, but it appears to be unnecessary to give any consideration to this material. So far as our experience has gone, it is safe to inject the blood of any healthy dog into any other dog.

The entire procedure is carried out under aseptic precautions; the areas punctured in each dog being carefully disinfected and the needles, rubber tubing and the jar being sterilized. The blood should be mixed with the sodium oxylate solution as it is drawn by gently rotating the jar back and forth with a swinging motion. All violent agitation of the blood should be avoided as it injures the blood cells. Very little pressure is required to inject the blood rapidly, probably about one pound.

In the demonstration two healthy dogs were used and the transfusion was carried out with entire success. Only about 50cc of blood was withdrawn from the donor. Neither the donor nor the donee seemed to be affected by the transfusion.

Mastitis in a Cow

Subject.—Six-year-old cow, heavy milker, with garget in two quarters of the udder.

Clinician.—C. H. Case.

It was stated that mastitis is the dairyman's night-mare and at the end of the year, he usually found upon casting up accounts that more animals have gone out of his herd because of mastitis than from any other cause, or from all other causes combined.

Conditions predisposing to mastitis are numerous. Feeding, especially a heavy corn ration, is one of them, but infection is the inciting cause in all cases, the infecting organism usually being a streptococcus. Failure to remove all of the milk is an important predisposing cause. The disease can be carried from one cow to another by dirty hands or improperly cleaned milking machine cups.

It is seen more frequently in cows that are insufficiently bedded than in animals that stand knee deep in clean straw, perhaps because under the latter conditions there are fewer traumatisms to the udder and less chilling of it by cement floors.

The speaker recalled treating one herd in which there were 20 severe cases at one time, and he recalled another herd in which all five animals milked by one man were affected. This man was a poor stripper. He

was replaced by a good stripper and in two years no more cases occurred.

He regarded the cloths used to wipe the cow's udder as an agency frequently responsible for carrying the infection from cow to cow.

He was called to one herd that was producing grade A milk, but the count had suddenly risen to 300,000 per cc. In going over the herd, seven quarters were picked out by physical examination as being affected with garget. The milk from these quarters was eliminated from the general supply and the count at once dropped to 3,000.

Frequently, there is a chronic streptococcic infection in certain cows in a herd that will keep flaring up when the animals are subjected to any unfavorable condition, particularly when they are fed an extremely heavy ration. These animals can be found rather quickly by testing composite milk samples from groups of ten cows.

The most successful treatment for garget when it first makes its appearance is to milk every hour or turn the animal out with three or four or five healthy hungry calves to suck her. That number of calves will keep the udder cleaned out and nothing else promotes recovery like the frequent removal of all the milk from the udder.

As a general treatment for mastitis, formalin has been used a good deal. The speaker does not use it as much as formerly because it decreases appetite and that lessens production for a considerable time, and that is objected to by the dairymen.

For local treatment, the speaker advised bathing with hot water and then massage with a white liniment. As a last resort in the treatment of mastitis, the speaker advises taking a quart of the gargety milk, heat it in a pressure cooker under 16 pounds of live steam for one-half hour, at which time the whey would be found to be separated from the coagulum. This whey was filtered, 0.5% of formalin added, and then injected subcutaneously or deeper into the sternum, night and morning, in 20cc. doses. The results of this treatment were not uniform but in some cases it acted almost like a miracle, the garget entirely clearing up in three days.

Mastitis in a Heifer

Subject.—Heifer about eighteen months old.

Clinician.—C. H. Case.

This heifer had a history of having had an enlarged front quarter of the udder when a calf, from which a serum like fluid could be milked. After some months the enlargement subsided and the secretion stopped, but now that the animal was five months pregnant it had enlarged again and contained a lymph-like fluid with an admixture of milk flakes.

The clinician stated that this condition was due to permitting calves to suck one another, that the quarter of the udder was probably ruined.

He stressed the importance of muzzling calves after feeding where two or more are kept in the same pen, stating that they did better and occurrences such as this, which were common, were avoided.

Teat Injuries

Subject.—A young cow with an obstruction in one teat.

Clinician.—C. H. Case.

It was started that 85% of teat injuries occurred right at the distal end of the teat and are due in most instances to the cows stepping on their own teats when getting up. This cracks open the end of the teat, scar tissue forms and the flow is stopped or the animal becomes a hard milker.

Another frequent ailment in teats is fistula. Some of these are congenital, others are the result of traumatism. Supernumerary teats are sometimes cut off by the owner to improve the appearance of the udder and if they connect with any secreting tissue they form fistulae. A better way of removing supernumerary teats is with a rubber band. If they connect with secreting tissues, an abscess may form and require to be opened. Supernumerary teats should, of course, be removed before the cow begins to lactate; in fact during calfhood. However, they can be removed successfully later. The later operation is likely to be more complicated.

Wirecuts, even those extending to the milk duct, are easy to treat if they are operated upon right away. The mucous mem-

brane should be sutured with cat gut and the skin and subcutaneous tissue sutured with strong silk. The wound should then be covered with collodion and securely bandaged with adhesive tape. It is essential to use a milking tube for six to nine days and to drain the milk out of the udder frequently. It must not be allowed to accumulate to a point where pressure will be allowed to form in the quarter. A tube with a cap can be used and allowed to remain in the teat.

Gangrene of the udder is a frequent result of the treatment of milk fever by the owner. The speaker was recently called to treat two such cases. The animals were very ill, exhibiting profound toxemia. A 400cc. injection of a solution of metaphen 1:1000 was given intravenously. In six to eight hours, the animals were much better, inclined to eat and ultimately recovered. In each case, the gangrene affected only one quarter. This quarter sloughed out, or virtually dropped out with just a little help in each case.

Veterinarians can render a good service to dairy owners by the treatment of hard milkers whether the hard milking be congenital or, as is usually the case, the result of a minor injury to the end of the teat. Tie the head forward, and the right hind foot back. Clean the end of the teat with peroxide, disinfect with tincture of iodine, insert the bistoury and cut on both sides, directly in front and directly in the rear, the subcutaneous tissues at the end of the teat, but do not cut through the skin. Enlarge these cuts until the milk comes easily in a large stream. What is known as Green's teat bistoury is preferred for this operation. It is essential that the clotted blood be milked out after about 15 minutes, and every hour after that for five or six hours.

If the cut is made in the right or left (lateral or medial) sides of the teat, hemorrhage will be much greater than if it is made directly in the front or directly in the back.

The condition referred to as "spider" in the teat, is a harder proposition to handle, but is treated in the same way, that is the obstruction is completely severed forward and backward. The after treatment, however, differs. After all the blood clots are removed, the teat must not be milked out clean for several days, but sufficient milk should be left in the teat to keep it at all times distended. This, of course, creates a condition favorable to garget, but it can't be helped and is just one additional reason for performing this operation under the strictest surgical asepsis.

VETERINARY PUBLICITY IN INDIANA

The Indiana Veterinary Medical Association is sponsoring a series of articles on Live Stock Health in the *Indiana Farmer's Guide*, published at Huntington.

The project is conducted by Dr. R. C. Julien, former State Veterinarian. The first of the series, "When Animals Get Sick," was written by Dr. R. A. Craig, head of the Veterinary Department, Purdue University, and was given first page space in the issue of the *Guide* for May 23rd. The article presents a splendid argument for the use of veterinary service by live stock owners and some record of the achievements of veterinarians. The following paragraph is a sample of the advice given:

"The inspection of newly-purchased animals before placing them in the farm herd or flock is the most valuable service that a practicing veterinarian can render a client. A community served by one or more graduate veterinarians is a safer place to raise live stock than a community that does not have this service. A correct diagnosis is necessary before a disease can be treated intelligently and effective control measures used."

A reprint of the whole article could be used profitably by veterinarians not only in Indiana, but everywhere, as an enclosure with bills or other mail sent to their farmer clients.

The Indiana Association, the conductor of the department, and the author of the article are to be congratulated upon the excellence of this first presentation of the case for the veterinarian. The *Indiana Farmer's Guide* is to be commended for initiating a department destined to be of very great value to its readers.

Acidosis of Pregnant Ewes*

THERE is a disease of sheep responsible for considerable losses in some sections, that is called by various names, pregnancy disease, stercoremia, preparturient paresis of ewes, etc. Since the disease occurs in pregnant ewes and an acidosis is present, there is probably no better name than acidosis of pregnant ewes.

We have been investigating this disease somewhat for the past few years. We think we know what causes it and what will prevent it, but it will take us three or four more years to prove or disprove our theories.

At the Kentucky Station, we have a very excellent flock of sheep. They are cared for by a native Scot. He does not know or care anything about acidosis of pregnant ewes. He has no loss from this disease. He learned when a boy, probably his father told him, that a certain type of care and feeding is necessary to keep sheep healthy and to get lambs on the market in a condition to bring the top price and make the most profit.

We think that a feeding of alkalies will prevent the disease. We believe it is the result of poor feeding, of feeding a ration low in calcium and perhaps other mineral elements. The condition develops from a few days to a few weeks before lambing time. The mortality is easily 90%. The condition has been wrongly diagnosed frequently. It has been called grub in the head, in some of our literature; in other literature, hemorrhagic septicemia; Law describes a disease which he calls "neurasthenia in pregnant ewes." I think there is no question but that it is this same pregnancy disease. Describing the symptoms of neurasthenia in pregnant ewes, Law in the 1911 edition, Volume III, Page 181, says:

> The most prominent symptoms are leaving the flock, moping alone, grinding the teeth, drooping and trembling of the head and ears; temperature normal or subnormal; respiration 24; pulse 80. Feeds and ruminates sparingly. Conjunctiva hyperemic. In some cases stupor and partial blindness. Muscles soft and flabby. The abdomen may be full but its wall will be quite placid so that the lambs can be easily felt. If the disease advances, all symptoms are aggravated. Food is no longer taken. Rumination ceases. The ewe remains recumbent, cannot be made to rise. After 24 hours of this helpless condition death supervenes.

Under causes, he gives: "Enforced inactivity, twin pregnancy, dry ration; occurring in ewes at the approach of completion of gestation."

One could hardly give a more accurate description of the disease.

Hutyra & Marek, Volume II, page 439, describes the same condition under acute diffuse parenchymatous hepatitis of the sheep, referring to it as a peculiar disease among pregnant ewes occurring in January and February, the animals being markedly dull, lie on the ground with half closed eyes.

Cases have occurred in Kentucky both in animals that have been kept in the feed lot and those in the pasture, more commonly in the latter perhaps than in the former. In cases occurring in the pasture, the animals are noted to shake their heads a little; they walk raising the fore feet very high, have difficulty to walk up an incline; lag behind the flock; grind the teeth; travel in a circle. As the disease progresses, they turn the head to one side and are inclined to push against a fence or the barn. If they walk down into a ditch they are unable to get up out of it. When they first go down they take the position typical for milk fever in cows and later stretch out flat. A tremor runs over them when they are touched. The urine was found on analysis to be acid.

An examination of normal urine of 40 ewes gave a specific gravity of 1.031. The urine of 31 ewes suffering from acidosis of pregnancy gave a specific gravity of 1.027. The reaction of the urine of the normal ewes was alkaline; of the affected ewes, acid. The urea of the urine in normal ewes was 2.5%; in affected ewes, 1.5%. The calcium content of the blood of normal, non-pregnant ewes was found to vary between 10.7mg and 8.5mg per 100cc of blood. The cal-

*Notes from an address by W. W. Dimock, Professor of Animal Pathology, University of Kentucky, Lexington, at the Twelfth Annual Illinois Veterinary Conference, University of Illinois, Urbana, February 10-12, 1931.

cium content of normal, pregnant ewes was found to vary between 10.4mg and 8.2mg per 100cc of blood. The calcium content of the blood in 31 ewes affected with acidosis of pregnancy varied between 10.1mg and 3.7mg per 100cc of blood.

As a rule, affected animals are rather thin in flesh and have been fed on hay low in calcium. Feeding in the proper manner will prevent acidosis. In the station herd, which is well fed, only one case of acidosis has occurred in the 14 years during which it has been under observation, and there is some doubt as to the diagnosis in that case.

The best way to maintain the proper amount of calcium and other minerals in the blood is to feed a proper ration.

We believe that acidosis of pregnant ewes is primarily a nutritional disease. Winter pasture, which in our state is a poor feed, is a prolific cause. A rather commonly held theory that sheep will thrive on brush and weeds is another cause. Somehow the idea got abroad that sheep could be depended upon to clean up the weeds on a farm, but I noted that sheep will eat weeds only when a good grass is not available.

All of the legume hays are rich in calcium and the grains, except wheat, bran and oil meal, are low in calcium. None of the sheep which we have seen affected were getting any legume hay, any bran, or any oil meal. You can't correct the condition or prevent it if you wait until late in the winter to begin or until cases have appeared. Feeding for the prevention of acidosis in ewes should begin at breeding time.

Some ewes were fed experimentally on a ration very low in calcium (timothy hay and grain), for a period of seven years. For two years, there was no fall in the calcium content of the blood, and it was not until the fourth year that acidosis was produced. At that time, the calcium content fell to 4.8mg per 100cc of blood. In a second case that occurred later, the calcium content had fallen to 3.7mg per 100cc of blood.

The speaker did not mention the observation frequently made by others that preparturient paresis occurs usually in ewes bearing twin lambs, and his observation does not support that of others that the disease is exclusively a disease of ewes that have been kept penned up in a lot and given dry feed, with little or no opportunity for exercise. Nor did he confirm the experience of others that forced exercise would stop, in one day, the occurrence of the disease in a herd.

The charts supplied were by no means convincing, to the reporter, that the disease is due to a hypocalcemia; in fact, they could scarcely be said to support such a theory, since the blood of some affected sheep was practically as high in calcium content as that of any normal sheep, and higher than many of the normal ewes, both pregnant and non-pregnant.

Further, if the two affected ewes showing the greatest degree of hypocalcemia, the calcium level of which fell to 4.8mg and 3.7mg per 100cc of blood respectively (experiment animals), were eliminated from the calculations, the calcium content of the blood of the remaining affected ewes was not materially lower than that of some ewes classed as normal and only a little below the average calcium content of normal ewes.

Until further experiments offer additional support to the theory that preparturient paresis of ewes is a hypocalcemia, we shall have to regard it as in the past, a condition in which twin pregnancy, dry feed and lack of exercise are the predisposing or exciting causes, or both, and regard a slight hypocalcemia, if it exists generally, as but incidental, or a concomitant result of the basic causes of the condition.

Greig of Edinburgh has made many analyses of the blood of ewes affected with pregnancy disease and is positive in the assertion that the condition is not a hypocalcemia. Further, he reports that calcium therapy, specific in hypocalcemia of cows (milk fever), is not effective in relieving pregnancy disease.

The observation that the urine is acid in reaction in pregnancy disease is a valuable contribution to the information available on this subject. Its significance, however, cannot be evaluated until further observations are made of the reaction of the urine of sheep suffering from various other conditions in which the animals cease to feed.

Under such conditions, the sheep sustains life by oxidizing its own tissues, thus becoming in effect a carnivorous animal, in at least many of which an acid urine cannot be regarded as pathological. Even if acidosis be abnormal in fasting sheep, in support of which Doctor Dimock offered no observations, it still remains to be shown that it reaches a degree of acid toxemia before it can be accorded pathological significance.

FOWL POX PREVENTABLE

The vaccination of young birds against fowl pox, is coming to be a general practice among flock owners in areas where this disease already exists. They find in this a means of preventing outbreaks in their flocks of pullets during the heavy laying season. In several states the poultry specialists have held demonstrations to show the methods of flock management and treatment necessary. The treatment is inexpensive and can be administed in a comparatively short time.

The best time to vaccinate the pullets is in early summer so that the effects of the treatment will not extend into the fall months when the birds should be laying high-priced eggs. The most common practice is to vaccinate the young pullets when they are from 4 to 5 months old in order to allow them at least 30 days on range before they go into the laying house.—H. L. Shrader, extension poultryman for the U. S. Department of Agriculture.

END OF IOWA'S TUBERCULOSIS WAR

The plea of more than 150 Mitchell County, Iowa, farmers to prevent the compulsory tuberculin testing of their cattle, that was appealed to the Supreme Court of the United States was recently dismissed for a want of a substantial federal question. The Iowa Supreme Court had previously held that the compulsory tuberculin test law is a reasonable exercise of police power. As a result of the first test in Mitchell county, 2,643 animals were condemned for tuberculosis.

A FIELD AGGLUTINATION TEST FOR PULLORUM DISEASE*

A field test for pullorum disease is much needed. The poultryman needs help and needs it badly in connection with the disease. He has received very little assistance from veterinarians. The pullorum test was introduced by Ward and Gallagher some years ago, but it does not show more than 80% agreement with the agglutination test. In other words, it is little better than a guess.

The tube test for pullorum disease is a strictly laboratory test, requiring a skilled technician. It involves shipment of tubes, loss of identity, obscuring the labels with blood, errors in the measurement of serum, differences in concentration of antigen, five days' time under the very best conditions, and making the test in the laboratory is extremely laborious.

The rapid agglutination test shows much promise. It requires but little equipment, can be made immediately when the blood is taken, does not require the birds to be held, but allows for a final disposition of them with one handling. Properly conducted, there is no loss of identification and reading; it does not cause the headaches that making the tube tests causes. But 0.02cc of antigen is required, and an equal quantity of blood. In no case is it necessary to wait more than five minutes for the reaction, and most positive reactions can be read within one-fifth of that time. Several tests can be under way at once, and a veterinarian, with one helper, can make 40 tests an hour, with good facilities.

The test is most conveniently made with a stained antigen. Not enough work has been done with it yet to be positive as to its accuracy, but it meets every other requirement, and if, on further experimentation it is found to be reasonably accurate, this plate method, with stained antigen, will solve the need for a practical field test for pullorum disease of chickens.

*Notes from an address by Don R. Coburn, East Lansing, Michigan, at the Eighth Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 26-30, 1931.

Common Intestinal Parasites in the Fox

By E. E. Sweebe, North Chicago, Illinois

Ascarids

THE ascarids or round worms are the most common intestinal parasites of the fox. The ascaris is more dangerous to the young fox but its presence is of importance in the old fox in the control of the infestation of puppies.

The species of ascarids found in the fox are *Belascaris marginata, Belascaris cati* and *Toxascaris limbata,* all of which are found in the dog and cat. The *B.* marginata is the more common of the round worms and the species most prevalent in the fox.

The mode of infestation and life cycle of the ascaris is important in control and irradication of intestinal parasites. It is also important in evaluating symptoms produced by ascarids infestation not to confuse them with the symptoms of other diseases, especially respiratory infections and digestive disturbances.

Life Cycle.—The ova of the ascaris are voided in the feces and in due course are ingested and reach the stomach. The shells are dissolved by the gastric juice and a molting takes place and the larvae reach the intestine. From here the larvae start on the journey through the tissue and enter the blood stream finally reaching the liver and lungs. Considerable damage may be caused in these organs while the larvae are developing and may produce symptoms which are mistaken for other diseases. From the lungs the larvae are coughed up and swallowed and again reach the stomach and intestine where they develop into the mature parasite.

Puppies conceived by an infested vixen may become infested *in utero* and in such cases the adult parasite will develop in puppies during the first few days following whelping. I had the opportunity of posting several five-day-old fox poppies last spring and found them infested with ascarids to such an extent that the parasite had burrowed through the intestinal wall into the peritoneal cavity and also entered the bile ducts and the liver. Treatment in such cases is, of course, hopeless.

Puppies born free from round worms become infested by nursing or from the contaminated litter. Puppies harboring parasites are also predisposed to rickets and other nutritional disease. Unthriftiness is noted, distended abdomen, slow growth, diarrhea and possibly fits.

Control and Treatment.—Control measures are important in protecting the puppy crop against ascarid infestation. Both male and female foxes should be given an effective vermifuge in the fall or late winter before the mating season and all litter and droppings cleaned and burned. Microscopic examination of droppings from each fox is, of course, the only positive method of diagnosis but this is usually impossible where from 1,000 to 3,000 pair are ranched. Experience has shown that by administering an efficient vermifuge to the adult foxes prior to the mating season or as late as possible so not to disturb mating, the puppy crop will be born practically free from worms.

It is always a wise practice to worm puppies at the age of four weeks and repeat again every four weeks until pups are three months old. Clean and disinfect runs and collect droppings daily to prevent reinfestation.

Several reliable vermifuges are on the market. Oil of chenopodium, tetrachlorethylene or santonin have proved effective and safe. When using tetrachchlorethylene, care should be taken not to crush the capsule while administering it or asphyxiation may result.

Hookworm in Foxes

Uncinaria polaris is the common species of hookworm found in the fox. The hookworm differs from the round worm in that it is a blood sucker and attaches to the mucosa of the small intestine. They cause considerable destruction to the intestinal

mucosa, setting up small hemorrhagic areas, offering a channel for the invasion of bacterial infection.

The hookworm affects the half-grown or adult fox and symptoms are manifested such as unthriftiness, bloody diarrhea, depression and exhaustion.

When the hookworm ova are expelled and climatic conditions are favorable the larvae are soon hatched, otherwise the egg may remain inactive until climatic conditions are proper. The larvae then pass other stages of development in the soil after which they gain entrance into the body either by way of the skin or digestive tract.

Treatment.—A vermifuge should be administered to animals immediately after symptoms appear or soon as the presence of the parasites is demonstrated. Tetrachlorethylene is probably the most efficient vermifuge for the removal of hookworms. The fact that ground remains infested with hookworm eggs and larvae, makes the reinfestation problem a hard one to solve. A complete change of pens of course would be the ideal procedure but this is usually impracticable. Therefore, the frequent use of disinfectants is advisable. Probably solution of lye is most efficient.

Vermifuges of all types are toxic and should be administered with care. Laboratory tests have shown that animals fed on calcium lactate for several days will withstand many times the maximum therapeutic dose of either carbon tetrachloride or tetrachlorethylene, while one-half the ordinary dose will kill an animal suffering from a calcium deficiency. Therefore, in treating foxes that are heavily infested with parasites and showing signs of being undernourished and weak, it is advisable to feed calcium lactate for a few days preceding the administration of the vermifuge.

Animals suffering from gastro-enteritis also may show toxic symptoms after the administration of a vermifuge. In every case of parasitic infestation the animals should be observed and carefully judged as to their general condition and extent of infestation when selecting the type of vermifuge.

Although thousands of fox puppies die each spring from parasitic infestation as many or more are killed by the injudicious use of vermifuges.

Many digestive disturbances caused by improper diet and bacterial infection will lower the resistance of the animal and produce symptoms simulating intestinal parasites; in such cases, if vermifuges are carelessly administered death will result. Therefore, a positive diagnosis should be made in each case of suspected intestinal parasitism and each individual animal should be considered as to size and resistance before treatment is given.

These remarks are general and by some may be considered far from being scientific, but I am confident in that my convictions have been proved by experience, that, if sanitation, prevention and control are practiced in old foxes very few parasites will be present in fox puppies and there will be no need to endanger the lives of the fox puppies by the use of toxic vermifuge preparations.

RECIPROCITY IN LICENSES

In reply to Rembrandt Morgan's article in the June issue of VETERINARY MEDICINE (page 217): There are but few veterinary colleges in the United States and each of these schools draws from the several states surrounding the one in which the college is located. It is natural for the graduates of such colleges to take the state board examination in the state in which the college is located. Some locate in the state in which the college is located, and some want to go to some other state. As I see it, if the graduate has passed his state board examination and holds a diploma from a recognized college, he should be allowed to present his diploma and his state board grades or his license from the state where issued to the examining board in the state where he wants to practice, with the license fees for that state, and be recognized without an examination. Doctor Morgan asked for the views of other practitioners, so here is mine.

F. R. Bartlow,

Indianapolis, Ind.

CHICKEN-POX CONTROL*

All species of animals suffer from pox and probably in all cases it is due to a filtrable virus. Assuredly fowl pox is due to a filtrable virus. Two types of the disease commonly occur (1) affecting the comb and wattles, causing round, raised ulcer-like lesions with the formation of a heavy scab, and (2) internal pox, which is essentially a canker of the mouth, pharynx and throat. It is frequently referred to as avian diphtheria. This latter form occurs far more frequently in Illinois flocks than does the external pox.

Fowl pox is to some extent a seasonable disease occurring most commonly in the fall and winter when the birds are in production. It spreads very rapidly through a flock and the chief loss it causes is a loss of production. The mortality is low.

All ages of chickens are susceptible. For six years at the University we have been studying fowl pox control. By vaccinating birds and later subjecting them to inoculation with virus it was shown we could produce quite a high state of immunity.

The vaccination is made by scarifying the comb and rubbing in a quantity of the virus. After two weeks, the heavy scabs are collected and kept until we are ready to vaccinate. Then they are ground in a mortar, mixed with sterile salt solution and the vaccine is ready. The vaccine is capable, of course, of producing the disease and must be handled accordingly.

The vaccination must be made on some part of the body other than the head. If made on the head, the bird will be given a true case of pox. The skin of the wing offers the most convenient site for vaccination. A few feathers may be plucked and the vaccine brushed into the follicles with a camel's hair brush, but we like best the stab method, by which either a sharp pointed scalpel wrapped with adhesive tape to about ⅛-inch from the point, or a sharp pointed scissors, may be used. In either instance, the instrument is dipped into the vaccine and quickly stabbed into the skin. It makes no difference if it goes entirely through the skin. Sufficient vaccine will be left on the skin to inoculate the bird. Some have used an ordinary hypodermic needle passing it through a rubber cork in a 30cc vial containing the vaccine. The choice of the method depends upon the operator. Some like one method, some like another.

In vaccinating birds caution must be taken. The first thing to be considered is the time. The most satisfactory season for vaccinating is in the early fall before laying begins, because if the vaccination is postponed until the birds are in full production there will be some loss in production occasioned by the vaccination. And another thing, birds at this season are running outdoors, are in a high state of nutrition and usually are in good health.

Another thing to be considered is the health of the bird. Birds that are heavily parasitized or suffering from a low form of any infectious disease as for example fowl cholera, are likely to show a heavy loss following vaccination and to bring severe condemnation on the veterinarian doing the work. Another thing to look out for is infectious laryngotracheitis. This disease existing in a mild form and unnoticed unless a careful examination is made, may be set off like wild fire by pox vaccination.

Recent work indicates that pigeon-pox virus should probably be used for the vaccine. Chickens are less susceptible to it than to fowl pox virus and it is not nearly so likely to result in disaster where used in heavily parasitized birds or birds suffering from any infectious ailment. The immunity conferred by a vaccination with pigeon pox virus is probably not quite so solid as that given by the fowl pox virus but it is quite sufficient for all practical purposes.

We advise against the vaccination of fowls on farms where pox has never appeared unless because of disease in neighboring flocks there is a probability of its occurrence. All birds in the flock should be vaccinated if any are vaccinated. Any susceptible birds not vaccinated will contract the disease from vaccinated birds.

*Notes from an address by W. A. James, Assistant in Animal Pathology, University of Illinois, Urbana, at the Twelfth Annual Illinois Veterinary Conference, University of Illinois, Urbana, February 10-12, 1931.

On premises where fowl pox has occurred from year to year, it is advisable to vaccinate all birds annually, not only the new crop but old birds that may have been vaccinated the year before if they are kept over.

It is very essential to examine all of the birds in 10 to 15 days after the vaccination to see if a "take" has occurred. It should be remarked here that the same place and the same wing should be used as the site of vaccination for all birds in the flock. It simplifies the second examination to see if there is a "take."

A "take" is indicated by the development of a heavy scab at the point of inoculation. If there are no scabs, it indicates that the vaccine has failed to "take" in that bird and it should be revaccinated. Two failures to "take" indicates an immune bird and no further attention need be given the flock.

PAINS PAY WITH PIGS

A hog may be "pig headed," but he's consistently that way. He gets what he wants and needs, or somebody pays for it. When six or eight healthy baby pigs are presented to the farm owner, they will prove an asset or a liability, depending on how they are handled. If given clean food, good shelter and good sanitary conditions, they will return the compliment by feeding the family, paying the installment man, or rooting up the mortgage. If put in small dirty pens and forced to eat what no other self-respecting animals want, they are apt to show up in red ink on the farm books. In the past when pork prices were low, the death stalker of the swine world, hog cholera, ranged far and wide. Low prices and less care seem to be team mates leading a dreary procession to a dismal end. Maryland producers of chops, chittlins and chines will not stand with bowed heads while their hogs march to dirge music, if they do not expose them to the danger of cholera by feeding infected bones, rinds and scraps of pork, and do not permit animals exposed to the disease to come in contact with them.

Mark Welsh.

College Park, Maryland.

ADVANTAGES OF A POLICY FOR THE VETERINARY PROFESSION

At a number of veterinary meetings during the past winter, I have tried to discuss the general set up that confronts the veterinary profession at this time. It seems to me there are certain things that should be done and it has been my intention to try to get the profession to thinking about these things.

Any discussion of the veterinary profession brings up the medical profession. It seems to me that the medical profession has come much nearer to attaining its objective, than has the veterinary profession, the medical profession, however, has come under fire from a good many directions. It is possible by taking thought in the matter that we may be able to avoid some of the troubles that the medical profession has experienced. For example, the medical profession has come under fire from various outside interests, the chiropractor, the osteopath and the naturopath, the faith healers and drug store healers, etc. So far the only outside interest that has attacked the veterinary profession is the county agents and extension workers.

The medical profession also has an internal problem that veterinarians do not have. The medical profession is overcrowded. They are graduating 4,000 students a year. The veterinarians are graduating only about 150 a year. As a consequence of this, the medical profession has to deal with fee splitting and severe competition that the veterinary profession does not know.

I believe that the veterinary profession can advance to its objectives over an easier route than the medical profession has advanced, if we profit by their failures and their successes. For one thing, we have but few schools and I hope that we shall continue to have but few schools. We can supply the field and by taking counsel, can supply only the veterinarians that we are going to need to do the jobs we have been doing

* Notes from an address by Maurice C. Hall, Chief, Zoological Division, B. A. I., Washington, D. C., at the Sixth Veterinary Conference, Ohio State University, Columbus, March 18-20, 1931.

and do the jobs that we should be doing but have not been doing.

The psychology of the profession is important. By taking thought, we can to a large degree control our advance to our objectives. But, there is much that is not under our control. International problems, progress of invention, etc. These are things that are out of our control.

The medical profession is definitely committed against state medicine. The veterinary profession is not. We are fortunate in this because whether or not state veterinary medicine comes, it is largely out of our control. We should keep an open mind and see to it that practice and state medicine alike are made attractive so that either way the cat jumps, we will be O.K. Sociological and economical developments will decide this matter. It is up to us to be ready either way. We should make federal, state and municipal veterinary jobs as attractive as possible so that if practice fails, federal, state and municipal employment will be a good place to which to go.

The principal argument against state medicine that is, that men in public employ will not do their best, because the rewards are not sufficient, is fallacious. Money is not everything, nor the most attractive thing, to our best men.

HOG CHOLERA*

It grieves me to hear veterinarians say that they cannot make a certain diagnosis of hog cholera. The history and symptoms of hog cholera are sufficient to make a diagnosis in a great many cases, and, taken together with the lesions, justify a positive diagnosis every time.

Formerly we were told that petechia, particularly in the kidneys, was one of the most dependable lesions of hog cholera. I regard it as one of the least reliable. There are three different lesions that, taken with the history and symptoms, justify a diagnosis of hog cholera: (1) Peripheral congestion of the lymph gland; (2) ecchymotic hemorrhages on the lungs (not pin point hemorrhages, but a sort of freckles that do not run together); (3) spleen involvement.

The entire spleen may be enlarged and darkened in color, or there may be irregular, dark, hemorrhagic areas. One of these three lesions is predominant in every case of hog cholera.

*Notes from an address by J. S. Koen, Bloomington, Illinois, at the Twelfth Annual Meeting of the Wisconsin Veterinary Medical Association, Madison.

NOW THE FUR PRODUCERS

The following from the *American Fur Breeder*, the leading publication of the fur farming industry, supports the often reiterated prediction of Maurice C. Hall, president of the A. V. M. A., that veterinarians in the near future must supply a greatly enlarged service for semi-domesticated and wild animals. The forward looking veterinarian will lose no opportunity to add to his information concerning the culture and the diseases of fur producing animals. The quotation follows:

CONSULT YOUR VETERINARIAN

Fur breeders are passing up a golden opportunity by not utilizing the services of their local veterinarian. It is true that the average veterinarian has not had much experience with the carnivora but if breeders will only stop to realize that these professional men have had a thorough training in animal diseases and treatment and that their hard-earned knowledge can be easily and intelligently applied to fur-bearing animal health problems they will quickly avail themselves of the opportunity to consult with their veterinarian on problems of health, nutrition and breeding.

I have found that the average veterinarian is keenly interested in fur animal breeding and its problems. Indeed, some of the best known fur breeders in North America are trained veterinarians. In all too rare instances veterinarians have been called in to treat sick foxes and mink and valuable information has come to light as a result of their contact with our industry.

I believe it would be a splendid idea for every fur breeder to seek out and get acquainted with his local veterinarian. You will find him keenly interested in your problems and glad to have the opportunity to study the carnivora at close range.

If you sense the beginning of trouble on your ranch call in your veterinarian at once. Don't wait until your animals are in such condition that medical treatment will be of no avail. This wouldn't be fair to your veterinarian because it will not give him a real opportunity to prove his value. GET THE HABIT—CONSULT YOUR VETERINARIAN — EARLY AND OFTEN!

Milk Fever and Like Conditions*

THE earliest reference to milk fever that I have noted in veterinary literature occurred in 1808 and from this time until the discovery of Schmidt in 1897, there were many theories advanced as to its cause and widely divergent lines of treatment advocated. But, one can say that no real progress was made during this period of 89 years.

Naturally when Schmidt advanced his toxemia theory in 1897 and offered a highly successful treatment, it attracted great attention. At this point I may mention that one frequently sees in veterinary literature or hears from veterinarians the statement that udder inflation is practically 100% effective in relieving milk fever. However, when one comes to investigate the matter, one finds that such is not the case. Ninety per cent cures is a more accurate estimate of the outcome of udder inflation in the treatment of milk fever than 100%. I think it is not far from the average result.

It will be remembered that Schmidt conceived a pathological process constituting milk fever was located in the udder and that at first he advocated the injection of a solution of potassium iodide into the udder, at the time potassium iodide being thought to be a very effective antiseptic. In a short time oxygen instead of potassium iodide solution was used for the injection and soon after that, air. All three media worked equally well.

With a satisfactory control measure in our hands, little study appears to have been given to the subject of milk fever for a number of years, but the past five or six years have been very productive of information on this subject. The new facts that have been elucidated in the matter of milk fever have been a result of the study of the normal blood chemistry of the cow and the blood chemistry during attacks of milk fever. A number have contributed to our information on this subject, among whom may be mentioned Widmark, Hayden, Shaw, Fish, Dryere and Greig.

Although all these and others contributed to the research and all discovered important matters in connection with milk fever, it remained for Dryere and Greig of the Royal (Dick) Veterinary College, Edinburgh, to demonstrate that milk fever is essentially a hypocalcemia and that it can be promptly cured by restoring the normal calcium level in the blood by the injection of calcium compounds intravenously or otherwise.

Two of these calcium compounds are commonly used, calcium chloride, which is very irritant and can be injected only intravenously, and calcium gluconate, which is non-irritant and may be injected intravenously, intramuscularly or subcutaneously.

Calcium therapy for milk fever is very efficient. The animals begin to improve almost immediately and are frequently on their feet in thirty minutes. But, injections if made into the vein, should be made in the jugular vein. The milk vein is too vulnerable a spot in which to make the injection because with calcium chloride, if there is any leakage from the vein or any failure to get the needle into the vein and a portion of the solution escapes into the tissue, acute swelling and frequently sloughing may be occasioned. With calcium gluconate, there is no danger of this, and this can be injected subcutaneously or intramuscularly and the region about the neck or back of the elbow is more convenient for the injection.

There are no untoward effects of the injection except as mentioned with the calcium chloride and in the case of aged animals there may be considerable shock from the intravenous injection.

An advantage of calcium therapy is that it does not interfere with milk secretion. The udder inflation of course, does stop milk secretion for a longer or shorter period. Quite frequently it is a week after the inflation of the udder before the animal reaches full production, and then with ud-

*Notes on an address by Willard Boyd, Professor of Veterinary Medicine, University of Minnesota, St. Paul, at the Sixth Veterinary Conference, Ohio State College, Columbus, March 18-20, 1921.

der inflation there is always the possibility of setting up mastitis, particularly if the dairyman performs the operation. On the other hand, the dairyman is not inclined to attempt calcium therapy.

The following cases are typical of the results I have had in a considerable number of cases treated:

Case No. 1. A typical case in a young cow. Calcium chloride was injected intravenously. The animal was up in six minutes.

Case No. 2. An old cow, improved in five minutes after the injection and had fully recovered in one hour. This cow was given in addition to the calcium chloride intravenously, a heart stimulant. I believe it is well to use a heart stimulant in old cows.

Case No. 3. This was an atypical case. The cow went down 48 hours after calving and I was called to see her 18 hours later. There was a complete paralysis of the hind legs, but no coma and the animal would lie up on her sternum and eat. Calcium gluconate was injected intramuscularly. The animal was up in five minutes, but the next day she went down again and the udder was inflated. There seemed to be not much improvement and after a few minutes an injection of calcium gluconate was given intravenously. Improvement was rather slow and it was not until several days that recovery was complete. This was a case about which there might be just a little question as to diagnosis. There was no coma at any time nor loss of appetite, apparently only a paralysis of the hind legs. Only 250cc of calcium gluconate was injected. Later investigation has shown that this is not sufficient dosage of this salt.

I have used calcium therapy on a number of conditions that appeared to be more or less related to milk fever, of which the following may be taken as illustrations:

Case No. 1. An animal in the fifth month of the gestation period, was unable to arise. There was no coma. This didn't look like milk fever and other lines of treatment were instituted. The following day another animal in this herd was down, presenting the same symptoms. They were perfectly comfortable, eyes bright, appetite good, but were unable to stand.

The first cow that went down was a low producer. Calcium chloride was injected intravenously and the animal was up in a few minutes.

Case No. 2. This was the other animal referred to in the same herd as Case No. 1. The condition was apparently just the same, but this cow was a heavy producer, and there was marked distension of the jugular vein. She was given 90cc of calcium chloride and after 30 minutes, an additional 30cc. Twenty-four hours later she was still down, and was given 250cc of calcium gluconate. She got up in half an hour. These animals had been getting bone meal and I could see no reason to suspect calcium deficiency and that was the reason for giving the very small doses of calcium chloride. The fact that she recovered under a larger dose of calcium, appears to indicate that a low calcium level of the blood was probably responsible for the condition.

Case No. 3. This animal was noted sick on December 7th, and was down two days later, when I was called to see her. She was just ready to calve, but was suffering from severe mastitis. One-quarter of the udder was bluish and distended with gas. Calcium was injected without effect. The animal died the following day of gangrenous mastitis.

Professor Greig believes that there is a considerable field for calcium therapy other than milk fever cases and I am inclined to think that we will find such to be the case. I believe paraplegia in swine is such a condition. Diagnosis, however, is important. If the condition is nutritional and probably a calcium deficiency, I think we have in calcium chloride or calcium gluconate an effective treatment. In feeding baby beef, swollen joints are rather common and the animals are unable to get up. We know that in feeding baby beef much grain that is deficient in calcium and little hay is used. This seems a field in which calcium therapy should be given a trial.

Diseases of the New-Born Calf*

THE control of diseases of the new-born calf depends almost entirely on prevention, and success in this control is limited only by the human element. The diseases of the new-born calf fall into three groups: (1) Septicemia, white scours and navel ill; (2) pneumonia and (3) poisoning.

In the first group, septicemia, white scours or navel ill, the calves are normal at birth, but are attacked within 36 hours to four days. The onset is sudden and the mortality is 100% in typical cases.

It is common to speak of disease as being due to an immediate and a remote cause, or to a specific and a contributing cause, or to a predisposing and an exciting cause. Where bacterial organisms are concerned, they are ordinarily spoken of as the specific or the active or inciting cause.

In the diseases of the young calf, we may just as well consider the classification as reversed. All of the calves may be exposed to the same infection and the contributing cause—exposure to a cold draft, the ingestion of bedding, etc.—may in reality be the actual or immediate cause of the disease. However, when the disease appears in one of a group of calves, it becomes infectious to the others and readily spreads to them without the intervention of other remote or immediate causes. In such cases, it will spread to older calves associated with the diseased one. In other words, the virulence of these organisms is stepped up until they become pathogenic to animals ordinarily immune to them.

This condition is epizootic among the calves in the eastern states some years. Other years it is not so bad. It also has a seasonal incidence. It is a housing disease to a degree. It usually begins in the fall with heavy losses. It is much less frequent in warm weather.

Jensen of Denmark has made the most useful contribution to our knowledge of the diseases of young calves. He it was who discovered the relationship of colon organisms to the trouble. The colon organism is one that we cannot get rid of. We must learn to live with it.

Although various lesions are found in the diseased calf, Theobald Smith regards the colon organisms as being the important infective agent. He showed that it is necessary for the new-born calf to have colostrum and that it is in colostrum that it receives the anti-bodies that protect it. The new-born calf is susceptible to everything. If he gets colostrum, he is immune to everything, so in theory the case is very simple. However, in practice, one doesn't find it quite so simple because there are various conditions and circumstances that lower the resistance of the calf that has had colostrum.

Every disease is due to a combination of causes. This disease is preminently one in which attention must be given to the predisposing causes. As mentioned earlier, we cannot get rid of the colon bacillus, which is thought to be the active or specific cause. Every calf must be treated as an individual. The diseases of the new-born calf do not lend themselves to treatment by correspondence. Training and experience is of greater value in the treatment of this disease than in most others.

Dairy development is responsible for many dietetic ailments. Calves differ as other animals differ, and as people differ. Some of them are ravenous and will not only take too much milk but will eat anything else. Sometimes they are infected and have scours when they are born.

The colon bacillus may easily pass through the intestinal wall and bring about a bacteremia or an infection of the liver or kidney or other organs. As a rule, that ends the trouble promptly, but they may localize and then we get abscess formation and pneumonia.

The young calf that picks up foreign matter, if he doesn't die, will have scours every time he gets a decent meal for three months. Such calves will be stunted and ruined as

*Notes from an address by D. H. Udall, Department of Medicine, Obstetrics and Ambulatory Clinic, New York State Veterinary College, Ithaca, New York, at the Sixth Veterinary Conference, Ohio State University, Columbus, March 18-20, 1931.

breeding animals if they live. It is common to see yearlings with long hair and big heads that are stunted and constipated. This condition is usually due to foreign-body indigestion. Sometimes the result of the infection is only an enteritis. The organisms do not penetrate the intestinal wall. This type is frequently set up by exposure to cold or by a draft even if it isn't very cold. The etiology of the disease is affected by the diet more than by anything else.

On autopsy such calves are emaciated, there is an enteritis and gastritis present. There is likely to be bloody effusions all over the peritoneum and some of those in which death has occurred very quickly, may appear practically normal on autopsy. This disease of calves can be started at any time by improper diet or improper atmospheric conditions. It is not contagious under normal conditions but one once started in a bunch of calves, the virulence is stepped up and we are way to an infection of every animal unless they be segregated.

It is seen in calves on nurse cows, which is theoretically the way calves should be raised, but the cause here, as in calves fed from the bucket, is the ingestion of foreign bodies. Some calves will eat bedding, even peat moss bedding, when suckling nurse cows that give a quantity of milk ample for their needs. It is just in them to nibble at the bedding and to eat it.

Prevention lies in simply breaking the chain of circumstances that is always present when an attack occurs and breaking this chain of circumstances always works in preventing the trouble. General directions for handling the calves may be given as follows:

1. If possible, have the calves born in a box stall.

2. Leave calves with their dams for 12 hours and make sure that they get the colostrum. They won't always get it themselves. They should have it immediately they are born.

3. The colostrum is all the food the calve should have for 24 hours. That is all he got under primative conditions.

4. The end of the first 24 hours is a critical period. The calf is now hungry. His digestive system has not yet learned to function. He will blow up on a full feed. At this time, give him just one pint of milk and one pint of water.

5. The next day, start his regular feeding. This day he should get his third day's ration.

This ration is figured by allowing him a quantity of milk equal to 6% of his weight for the first day, 7% for the second day, 8% for the third day and so on, until at the end of ten days, he is getting 15% of his weight. Keep his allowance of milk at that point from then on and every day give him with his milk an equal quantity of water, or better lime water.

Another rule to follow where the dairyman will not take the trouble to weigh the calf daily and figure from the percentage of his weight how much milk to give him, is to give him on the first day that he is fed; that is for his third day's ration, one and one-third pints of milk and one and one-third pints of lime water; and to add to this one-half pint of milk daily. This amount should be divided into three feeds and be given him morning, noon and night.

6. The normal calf is very active, very vigorous and has a coat like a seal. When he lies quietly or stands in a stupor, when the coat is rough, look for trouble. It will usually be found in the diet.

7. Keep the muzzle on for at least two weeks and better, for a month and keep up the feeding system. When you are giving him a daily ration of milk equal to 15% of his body weight, stop the percentage increase but keep the feeding at that point, increasing it of course as the weight of the calf increases.

Calves with nurse cows require muzzles just as do calves that are fed from a bucket.

Pneumonia.—If the calf escapes the group of diseases that attack him within the first few hours of life, his next hazard will be pneumonia. Primarily, pneumonia in the calf usually comes along at the age of two months. It is infectious, but spreads slowly in any group of calves. However, the spread is sure. Practically all exposed calves will sooner or later be infected.

The mortality is high. We find a variety

of organisms associated with this type of calf pneumonia. Sometimes it is hemorrhagic septicemia. Theobold Smith found *B. actinoides*. One often finds streptococcus and other organisms, probably of no significance. What the most important organism is, I do not know. The activating cause is largely atmospheric. It is seen most commonly where calves are kept in basement barns or other enclosures with cold stone walls. Cold stone walls just don't seem to go with calves. One sometimes sees it in summer. Leaving the window of the calf barn open on a cold night in early spring will cause it. I believe that regular exercise out of doors will very largely prevent it.

Doctor Case of Ohio thinks it is largely a form of hemorrhagic septicemia and advises giving hemorrhagic septicemia aggressins to all calves at birth. Some have said that the hemorrhagic septicemia organisms can always be found in the heart blood of animals dead of pneumonia. Perhaps the reason others have not found these organisms is because they haven't looked there for them. The heart is apparently normal and it seems to be just human nature to look only in the lesions for organisms causing the disease. Hemorrhagic septicemia organisms are by no means constantly found in the lungs.

Isolation of the well animals is one of the important measures in controlling an attack of calf pneumonia. The sick calves had probably best be killed. The mortality is high in any case, and since the value of the animal is low at this time, it is probably best to make certain of eliminating the infection by destroying the sick animal.

If treatment is undertaken, a warm place in which to keep the calves is very important. Even in mild attacks, recovery will not exceed 60%.

Of course, the barn or other enclosures in which infected calves have been, should be disinfected and for this purpose time is a whole lot better than compound cresol solution. Compound cresol solution is alright if it hits the bug, but he may avoid it. He can't avoid the effects of time.

Poisoning.—The number of young calves that die of lead poisoning is far greater than the dairyman ever suspects. Calves will die from the ingestion of so small an amount of lead that the chemist will not find it unless he puts the whole liver through an analysis. The opportunity to lick almost any painted wood work is likely to result in the death of young calves from lead poisoning. It is frequently acute, manifested by a meningitis and the mortality is high. Treatment is mostly ineffective. Prevention consists in keeping calves and paint apart. Keep calves away from painted woodwork and keep old paint cans away from calves. Calves have died from picking up paint that had scaled off one of these familiar highway decorations otherwise known as signboards, and fallen in the grass in their pasture. The signboard was beyond their reach.

THE STATUS OF TUBERCULOSIS CONTROL IN ILLINOIS*

General and satisfactory progress was made in tuberculosis eradication in Illinois in 1930. There were 1,295,670 tuberculin tests made during the year. This included the testing of 122,000 cows in the St. Louis milk shed early in the year to meet the St. Louis requirement going into effect March 1, 1930, that milk distributed within the city must be from tuberculin tested cows.

Twenty-two counties were accredited during the year and six counties were reaccredited. Ten more counties should be accredited this year. Sixty-six of the 103 counties in the state are now accredited. In six counties no work has been done.

Thirty-one counties will require to be reaccredited during the year and this alone will keep the department pretty busy. We were a little disappointed that we did not cover more territory in 1930; when the testing in the southern third of the state was undertaken, it was hoped that we could test all counties in that section during the year, but at the close, six counties remained unaccredited. In four no work had been done. The other two had been tested once but require to be retested before they can be accredited.

*Notes from an address by D. W. Robison, Superintendent of Animal Industry, State Department of Agriculture, Springfield, Illinois, at the Twelfth Annual Illinois Veterinary Conference, University of Illinois, Urbana, February 10-12, 1931.

The cause for failure to cover all of the territory was in part due to a miscalculation as to the number of animals to be tested. We had relied upon the county treasurer's and the census reports for the number of cattle in those counties. These reports were 20% to 50% under the actual number found.

There was much objection to the testing in the southern part of the state, and we had to resort to the sheriff and to state police in many instances. Finally, an injunction was obtained from the district court in Springfield and this will have to be dissolved before testing can continue in the counties in the southern part of the state in which the work has not yet been undertaken.

One disappointment to the department during the year has been the inability to test all accredited herds as required by the regulations. This has resulted in some accredited herd owners losing their certificates of accreditation through no fault of their own. We hope to remedy this matter during the coming year, by the use of accredited veterinarians for testing such herds.

TREATMENT OF TURKEYS FOR PARASITES*

I was forced by the owner into the treatment of a flock of turkeys for parasites. I was on the farm in connection with other work and the owner insisted that I do something for his turkeys. He had 140 birds that he expected to have ready for market in about four weeks, They weighed 13 to 15 pounds, but at their age and the way they had been fed, they should have weighed 19 pounds.

I autopsied one or two dead birds, and one of the sickest, that I killed for that purpose, and found them to be harboring very large numbers of tapeworms. I found nothing else that could account for their poor condition and the loss. I administered colloidal iodine, and in an hour they were passing tapeworms.

There was no further loss, and in the following 22 days these turkeys gained from 3¼ to 4¾ pounds each. No work that I have ever done for a client has given better satisfaction than this job.

After seeing how well the market turkeys were doing, as a result of the treatment, I went back and treated the poults and the layers. The results in these birds were just as good as in the others. The owner was greatly pleased and profited not a little from the use of this remedy.

*Notes from a report by D. A. Curtis, Breckenridge, Michigan, at the Eighth Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 26-30, 1931.

THE VETERINARIAN AS A MUNICIPAL FOOD INSPECTOR*

The average span of life in ancient Egypt was about 30 years. Now, it is about 60 years. The greater part of this change has come about in the last 30 years. Improved sanitation has had much to do with lengthening the period of life. An important part of this better sanitation has comprised improved methods of producing and handling of food, for unwholesome food is the cause of both disease and death.

Legislation is necessary to carry out the purposes of food inspection, but legislation alone is by no means sufficient. The inspection is important, the inspector still more important.

A municipal or other food inspector needs to be patient, honest, impartial and qualified professionally. His decisions should be dependent upon scientific facts and not upon personal opinion. This excludes the layman as an inspector, for not being in possession of scientific facts upon which to base his decisions, however honest and impartial he may be, they cannot be based upon other than personal opinion.

Veterinarians Gaining in Meat Inspection—Losing in Milk Inspection

A questionnaire concerning food inspection was recently sent to 20 cities. Nineteen of them replied. These 19 cities employ 320 food inspectors. In milk inspection, 23 veterinary and 250 lay inspectors are employed. In meat inspection 60 veterinary

* Notes from an address by W. P. S. Hall, Toledo, Ohio, at the Eighth Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, January 26-30, 1931.

and 85 lay inspectors are employed. Only one of the 19 cities employs no veterinarian.

The veterinary profession is established in meat inspection and is gaining ground; that is, veterinary meat inspectors in proportion to the whole number of meat inspectors are increasing from year to year. This is not true, however, with regard to milk inspection. In this work the veterinary profession is making no progress and is probably losing ground due to lack of interest on the part of the individual and our schools.

Municipal meat and milk inspection differs very greatly in different cities. Recently dealers in a city having a meat and milk inspection ordinance applied for permission to sell meat and milk in Toledo, and as is required by the city ordinance, an investigation of their meat and milk inspection was made to determine if the products met the standard laid down for such foods in Toledo.

THE VETERINARIAN IN PUBLIC HEALTH SERVICE*

Evolutionary changes have come about in veterinary practice due to mechanical change and to much wider demands from animal husbandry upon the skill of the veterinarian.

The primary objective of veterinary curriculum is to prepare students for: (1) General practice; (2) state and federal live stock sanitary work; and (3) public health duties.

Of the three, public health is probably given the least consideration in our veterinary schools. There has been the least development in this phase and the least appreciation on the part of the public of the services that the veterinary profession can render this field. There are hundreds of municipalities that employ no veterinarian in any capacity and hundreds of health boards, of which no member is a veterinarian. On the other hand, there are city and county health boards that employ veterinarians in all capacities from president down.

A survey of the duties of veterinarians employed by health boards, indicate that 75% of them are doing more or less general food inspection. There is no question but veterinary colleges should give more attention to preparing veterinarians for public health service. The small contribution of the veterinary profession to this service in the past is due to neglect and the lack of some good promotion. It is perfectly legitimate to promote human health and welfare and that in part, good health constitutes.

Veterinary service in public health work is needed in every town having a population of 5,000 or more. This field of veterinary work should be increased at least fifteen fold. It would add to the prestige and regard of the profession. It would render the public a useful and a valuable service.

The question arises, is the veterinarian adequately qualified for public health work. In general, the answer must be "No." In meat and milk inspection, he is probably qualified. In other lines of public health work he is qualified almost not at all, although his fundamental instruction for such work is better than that of any other group or profession.

The Veterinary Department of the Ohio State University is engaged in a new and extensive survey of the needs of veterinary service in the public health field, and indicated changes in the curriculum will be made to meet these needs when they are ascertained. Further, in graduate work we shall offer the training required in short courses.

*Notes from an address by A. F. Schalk, Professor of Preventive Medicine, Ohio State University, Columbus, at the Sixth Veterinary Conference, Ohio State University, Columbus, March 18-20, 1931.

VERRUCA OF THE TEATS*

A client of mine has four fine Jersey heifers that he raised himself. They have just recently calved, but the teats of each heifer are completely covered with warts. On one cow the warts are so bad that the calf refuses to suck.

I have tried the usual applications without success. These warts are not rough on the surface, but slick and shiny. I should be glad if some one would tell me what to do for these heifers.

F. E. Styles.

Battle Creek, Mich.

Book Review

TUBERCULOSIS in Man and Lower Animals, by H. H. Scott, Medical Research Council, Special Report, Series 149. Published by His Majesty's Stationery Office, London. Paper bound, 269 pages, price 4 shillings, net.

The observations given in this report are a result of the author's comparative studies of tuberculosis disease in man and animals over a period of many years. His studies of the disease in man include autopsies on 300 cases of fatal tuberculosis among Chinese in Hong Kong. His studies of the disease in wild animals include many similar examinations of animals dying from tuberculosis in the London and other zoological gardens. Much of the material in this report is of interest to veterinarians. A large number of tables are given which cannot be reproduced here, but the following extracts from the text will indicate in some measure the character and scope of the work.

The statement has been made that bacillus of tuberculosis is ubiquitous and that no race is exempt. It would be more correct to say that the bacillus finds a home wherever civilization penetrates, and that though certain races or at least communities are exempt, there is no proof that any are immune.

In modern civilized towns — London, Paris, Vienna — the morbidity rate (from tuberculosis) is enormous, thus the results of the tuberculin tests indicative of infection give 20% among children under two years old, more than 50% in children under five years, 90% up to fifteen years, and 97% among adults.

The high incidence rate is generally accompanied by relatively low mortality, and conversely, where the natural morbidity rate is low, once the disease obtains a foothold, the mortality rate is very high.

Domestic animals, allowing for certain specific variations of susceptibility, occupy a position analogous to that of civilized communities and present a fairly heavy morbidity rate. The proximity and intimacy of contact with civilization play their parts in the prevalence of the disease in animals, just as they do in the case of man.

Wild animals under natural conditions correspond to isolated uncivilized races, and it is highly improbable that tuberculosis exists among them, while animals in captivity form the counterpart of the susceptible but previously germ-free native races introduced into a civilized and tubercle-laden environment. When they are attacked they can put up little or no resistance and fall ready victims to the disease.

Though it has been shown that infective human sputum may convey tuberculosis to dogs, no authenticated case is known of cattle, sheep or goats being infected by the human type of bacillus. In a large number of tuberculous dogs, 50% of the cases were due to the human type of bacillus, 25% to the bovine type, and the remainder to a "transitory" type. Swine, though most often infected by the bovine type, are also susceptible to the human and avian types. In this the author, of course, refers to conditions in England. In the United States, the avian type is far more common in swine than the bovine type of bacillus.

In buffaloes, tuberculosis exhibits several important differences as compared with cattle. Serous involvement in the form of pearls is quite rare, the lungs appear to be more vulnerable and often contain breaking down caseous masses when there is but little evidence of the disease elsewhere. Calcification is the exception in buffaloes.

Tuberculous Lesions in the Dog Atypical

Tuberculosis in the dog, there is no doubt, has been overlooked to a considerable extent in the past. The reason for it being missed is probably the peculiar anatomical character of the lesions in many instances. By no means infrequent are whitish, circumscribed tumors with viscid or mucopurulent centers in the lungs or perhaps more characteristically in the liver or kidneys. These tumors

have in the past been diagnosed by naked eye appearances as malignant neoplasms.

The infective bacillus in the dog may be either the human or the bovine type. Generally speaking, the former predominates in the ratio of about five to one. Of one series of 100 cases of tuberculosis in dogs, 51 had lived in restaurants where the floors were constantly soiled with human expectoration. Twenty-three others were in intimate contact with sick persons. Histologically, tuberculosis of dogs differs from that found in most other mammals.

Bovine Type of Bacillus Infects Cats

In cats, the infection is ascribed to drinking tuberculous milk or to human contamination. The former is correct, the latter erroneous. In 12 cases in cats studied, all were due to the bovine type of bacillus.

Human Type of Bacillus Infective for Parrots

Tuberculosis is fairly common in birds and due to the special avian type of bacillus. The alimentary route of infection far exceeds the respiratory. The smaller tubercles do not as a rule show caseation, though the larger ones do, but calcification is uncommon. The cecum is a favorite site of foci.

Parrots are susceptible to both avian and human types of bacillus. The latter appears to predominate, infection having occurred in captive birds kept in the houses of phthisical subjects. The bacillus isolated from tubercular birds often proves to be almost non-pathogenic to gallinaceous birds.

Like parrots, canaries are susceptible to both the mammalian and avian types of bacillus.

Lesions in Wild Animals

The lesions of tuberculosis in captive wild animals bears a very close relation to those met with in the corresponding organs of domesticated animals, with two important characteristic differences: (1) not having been previously in contact with the infection, they possess but feeble powers of resistance and consequently with them the disease runs a rapid course; (2) for the same reason, dissemination usually takes place early, so that at death, in spite of the short period of illness, the lesions are often found to be widespread and advanced.

A third difference frequently noticed is that after death with generalized lesions, there may be but little emaciation; in fact, several such animals which were to all appearances in excellent body condition up to a few days before death, exhibited on the postmortem table advanced and generalized disease. This absence of wasting, a feature so common in human cases and domestic animals, may in part be ascribed to the rapidity with which fatal termination is reached.

Carnivora Resistant to Tuberculosis

Just as tuberculosis is comparatively rare in domesticated cats and dogs, so are wild carnivora in captivity believed to be relatively resistant to infection.

Means of Dissemination

The disease of primates other than man strikingly resemble the disease in man. It is estimated that a patient (human) with open tuberculosis may expectorate four billion bacilli daily, and the bacilli are scattered not only by expectoration but by the fine spray of coughing and sneezing.

Congenital infection might theoretically arise from conveyance by ovum, by spermatozoa or a tubercular placenta. However, the ovum being non-phagocytic, cannot take up a bacteria, and the chance of a single fertilized spermatozoa carrying a bacillus are one in 30 million, an unlikely possibility.

There are, nevertheless, numerous cases on record of babies dying of tuberculosis at a very tender age (22 days, 24 days, 29 days, etc.), so that we are practically forced to the conclusion that congenital tuberculosis does occur and that the infection has arisen probably via the placenta of a tuberculous mother.

Portals of Invasion

Many studies might be cited to show the effect of environment. According to Lampson, 67% of children born of parents with open lesions became tuberculous. Twenty-two per cent of those whose parents had

latent lesions and only 2% of those from healthy parents contracted it. Gebhardt found that 800 bacilli administered to guinea pigs in diluted sputum produced infection by respiration whereas the swallowing of as many as ten or even twenty million might fail by the alimentary route. Again, 360 individuals, of whom 151 were children and 209 adults, drank milk for a long period coming from cows with tuberculosis of the udder, without contracting tuberculosis. In another group of 687 persons, of whom 280 were children, all consuming such milk, only two became infected. Both children and adults had taken the milk for one year and a half.

The intestine is well guarded. It is otherwise with the lungs. Tubercle bacilli when they enter the bronchi can effect entrance and cause tuberculosis in numbers which would be powerless for harm if swallowed. Among 300 cases dying from tuberculosis that were autopsied by the author, only 32 were definitely considered of alimentary origin.

The author does not specifically state that such is the case, but it is inferred that he regards the pulmonary infection as of respiratory origin if the infection is localized in either lung, and of alimentary origin when it is uniformly diffused in both lungs.

He finds the right lung far more frequently involved than is the left.

PARALYSIS OF DAIRY COWS*

In my practice, I see occasional cases of paralysis in dairy cows. In fact, I see them too frequently for my own peace of mind. There is no significant history obtainable in these cases. However, they occur more frequently in the spring and in the fall than at other seasons. The cow may be turned out to pasture in the morning all right in every respect, so far as the owner can see. When he goes to pasture in the evening to bring her in, he finds her down and unable to rise. Otherwise, she will be entirely normal.

She may have eaten the grass as far as she can reach in her prone position. She may even be eating at the time he finds her. The condition bears no relation to parturient paresis.

My treatment for these cases has been to give a saline laxative, and stimulants, usually nux vomica in full doses. In fact, the nux vomica is pushed about as far as the animal will stand. Practically all the cases are up in 48 to 72 hours. Calcium chloride was tried intravenously in two of these cases, without benefit.

PERITONITIS OF CATTLE*

In my practice, I find peritonitis of cattle due to two distinct causes. The great majority of the cases is due to severe dystocia, the remainder to exposure. Strangely, in severe cases following dystocia, there is no elevation of the temperature and in the very severe cases, there is always a subnormal temperature. The latter cases seldom recover.

The symptoms, of course, are staring eyes, stiffness and drawn flanks. A rapid, hard, wiry pulse and severe septic metritis are often found in addition. The majority die.

Treatment: One must be extremely careful in manipulation. The uterus must be douched and the accumulation of fluid siphoned off with great care. I give such cases a small amount of nux vomica (full doses are contra-indicated), quinine, ginger and sodium salicylate.

It is very important to resort to artificial feeding in these cases. The animals have no appetite and usually will not eat, no matter how tempted. Nevertheless, they do better if the stomachs and intestines are moderately filled with ingesta. The most convenient to give and at the same time a highly concentrated food is flaxseed. Use it whole and give as a drench. Molasses also may be used. Saline laxatives are contra-indicated in these conditions. They produce further irritation.

*Notes from a report by F. E. Stiles, Battle Creek, Michigan, at the Eighth Annual Post-Graduate Short Course for Veterinarians, Michigan State College, East Lansing, Janury 26-30, 1931.

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Reviews and Abstracts

Lowering the Cost of Feeding Cows

Until recently, dairy leaders everywhere urged farmers to buy high protein feeds with which to "balance" their rations. Recent research has shown that such advice is not always or usually good. Now farmers are advised to grow their feed including the proteins. Experimentation has shown that the chemistry of digestion and assimilation in the animal differs somewhat from the chemistry of the retort and that, whereas it was formerly believed that a "narrow" ration was essential to high dairy production, we now know that a wider cheaper ration is equally satisfactory and far more profitable.

Experiments at the Wisconsin College of Agriculture indicate that it is possible to meet the requirements of fairly high producing dairy cows (up to an average of 50 pounds of milk daily) with a home grown ration consisting of alfalfa hay, corn silage and common grains. It is not possible to meet these requirements with timothy hay, corn silage and grain or even with clover hay, corn silage and grain.

Dairy cows in milk need and use more food than any other class of farm animals. A cow giving the equivalent of 30 pounds of 3.5% milk or 20 pounds of 5% milk daily ordinarily uses about 50% of her ration for keeping up her body, including the energy used up in digestion and work done. The remainder of the ration goes for milk production.

Survey studies on the cost of milk indicate on the average a cow should produce 7,000 to 8,000 pounds of milk yearly, with the equivalent of 300 pounds of butter fat. In 8,000 pounds of milk, there are solids which represent about 272 pounds of protein, 300 pounds of butter fat, 292 pounds of milk sugar and 56 pounds of minerals. The constituents required for body maintenance are similar, and it is evident of course, that a cow must be fed a ration containing these compounds.

Proteins of different plant and animal feeds show marked differences in their efficiency. In the growing pig, for example, cereal grain proteins alone show an efficiency of less than 30%, while the proteins of milk reach an efficiency of 65%. Curiously and fortunately, when the proteins of cereal grain and proteins of milk are fed together, the protein efficiency of the whole is 60 to 65%.

Clover hay has long been regarded as a good hay for dairy cattle. However, the research referred to shows that it is far inferior to good alfalfa hay. The clover, hay, corn silage and home grown grain ration was found to be adequate for a production of only 20 to 25 pounds of milk daily. The substitution of alfalfa hay for clover in this ration made it adequate for a production up to 50 pounds daily.

For very high producing cows, it was found advisable to add some protein concentrate as wheat bran, linseed meal or cottonseed meal. Aside from its protein content, wheat bran is valuable in many feeds for its mineral content, particularly phosphorus.

Normal Bacterial Flora of the Udder

Since 1900 it has been known positively that the tissues of the udder contain bacteria in the majority of cases. The number and different kinds of bacteria usually found in the udder are small. It is evident that the bacteria must have certain properties before they can live in the udder and that these properties are not shared by the great majority of micro-organisms. The most important of these properties is the ability to survive the bactericidal action of the udder tissue.

Experimental work has shown that the number of bacteria in each quarter remains relatively unchanged during long periods and that the flora of a given quarter is remarkably constant.

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[1] Hart, E. B., and G. C. Humphrey; Cut the Cost of Feeding Cows; Agricultural Experiment Station, University of Wisconsin, Madison; Bulletin 417; September 1930.

[2] Dorner, W.; The Bacterial Flora of Aseptically Drawn Milk; New York State Agricultural Experiment Station, Geneva, New York; Technical Bulletin No. 165, July 1930.

Better knowledge of the udder bacteria is important from several points of view. Dairymen are interested in knowing to what extent primary contamination of milk can influence the bacterial count. Veterinarians interested in milk hygiene are especially concerned with pathogenic bacteria which may be present in milk from the time it is first drawn. Those interested in the manufacture of dairy products would like to know what effect the bacteria found in aseptically drawn milk would have on the products they manufacture. Veterinarians and dairymen alike are interested in knowing what part and under what conditions the normal bacterial flora of the udder plays in mastitis.

An examination was made of 993 samples of aseptically drawn milk from 132 cows belonging to six herds located near Geneva, New York.[2] The milk samples were examined by the standard agar plates and by the Burri quantitative smear culture technic.

The calculated average bacterial count of the milk from each herd showed great variations. The lowest herd count obtained on Burri slants was 3,965 per cc, while the highest was 9,635 per cc and the average count 7,475 per cc. On standard agar plates, the average counts from the individual herds varied between 530 and 4,390 per cc, the final calculated average being 2,775 per cc.

It appears that a small number of samples containing relatively high numbers of bacteria are usually the source of the greater part of the bacteria in aseptically drawn milk. There are only a few species of bacteria normally found in aseptically drawn milk. Organisms belonging to the micrococci and to *Streptococcus mastitidis, Brucella abortus* and *Bacterium lipolyticum* or related species are the ones usually found in the udder. The latter organism occurred in the greatest numbers, on the Burri slants, but is not found by the standard agar plate method. This, the author believes, accounts for the low counts obtained in aseptically drawn milk by other investigators. That is, they used the standard agar plate method for making the count and thus failed to find the organism occurring in greatest numbers.

On the whole, the herds investigated are among the better managed ones and the author believes that the counts as given above are possibly too low for the average herd.

If the counts obtained from the udder of healthy cows can reach as high an average as 7,475 on slants and 2,775 on standard agar plates, it appears to be a rather difficult task to produce milk having a total count of only 10,000 per cc. An arbitrary fixed standard of 10,000 per cc seems very low when it is realized that contamination by a certain number of bacteria from other sources is unavoidable in dairy practice. In order to get this low count continuously, it would be necessary for the dairyman to have the milk from each cow examined periodically and discard the cows with high counts. There is no doubt that such selection can be made and is being made in high class dairies, but the question arises, does the cost of the procedure involving losses caused by selling part of each herd and the cost of analyzing the milk of each cow periodically, correspond to a greater commercial value, and even more important, to an improvement in the intrinsic value of the milk?

The standard of 10,000 bacteria per cc is just at the point where the chances of a farmer having a cow with few bacteria in the udder plays a greater part in deciding whether the milk will be below or over the standard than does additional cleanliness and care. This should not be the case.

So long as the general belief prevailed that the number of unavoidable bacteria coming from the udder was low or below 1,000 per cc, the standard of 10,000 could be justified, but it appears from this investigation that a slightly higher standard would be better for the actual conditions, and would reduce to a minimum disagreeable disputes concerning premiums on low count milk which arise between the producers and buyers of milk. At the same time, it is not felt that raising the standards to meet this situation would reduce the real value of safety of milk.

The use of milking machines had no direct bearing on the bacterial count. Indirectly, in one herd, it was responsible for a high count because the dairyman using it did not examine the udder and thus did not discover the beginning of an attack of mastitis.

Coccidiosis in Fowls [3]

With the single exception of pullorum disease, coccidiosis is the commonest disease of young chicks and it is by no means unusual for it to cause heavy losses in young turkeys also.

Coccidiosis is most prevalent in the spring and summer months, and, unless early diagnosis is made and treatment provided, heavy losses will occur.

This disease is caused by a parasite called *Eimeria avium*. It develops in the inner lining of the intestine. In young chicks the portion of the intestine most commonly infected is the first six inches of the organ next to the gizzard and the ceca.

In chicks 10 days to three weeks old, usually the first symptoms of coccidiosis are ruffled feathers and an inclination to gather close to the stove as if chilled. Closely following these symptoms, blood may appear in the droppings. The disease may then spread rapidly through the brood until 50% to 75% are showing signs of the disease.

Bloody diarrhea is a sure sign of coccidiosis and is usually present. In case it is not present, a microscopic examination of the droppings or material found in the ceca will reveal the organisms and definitely establish the diagnosis.

When coccidiosis appears in a brood of young chicks, all parts of the brooder house should be thoroughly scrubbed with hot water containing one pound of lime to 40 gallons of water. The interior of the house must then be thoroughly disinfected. A new range must be provided entirely free from the contamination. A diet consisting very largely of milk should be employed.

Chicks affected with coccidiosis require more warmth than normal and an abundance of heat should be supplied not only under the hover but throughout the brooder house.

The parasite lives over in the soil from one year to the next.

[3] Durant, A. J.; Coccidiosis in Fowls; University of Missouri, Agricultural Experiment Station Bulletin 289.

Pullorum Disease

The author [4] recommends discontinuance of the use of the term "bacillary white diarrhea" for this disease, since it is not descriptive of the disease or a characteristic symptom, and is misleading.

The author holds with other writers that distinctive gross lesions are frequently absent in acute forms of pullorum disease in young chicks and that a bacterial examination is usually necessary for definite diagnosis. The diagnosis in adult birds depends upon the results of the agglutination test, and properly applied, the author thinks well of this test.

The disease is very prevalent among poultry flocks in California. Of 108 flocks containing 36,000 birds tested for the first time, reactors were found in all except four flocks, or in more than 96%, although there had been very little loss from pullorum disease among the chicks in this section. Pullorum disease among adult birds is usually recognized and not responsible for excessive losses from death, but causes various losses in other ways—a lowered production, lessened hatchability and lowered vitality of the chicks that do hatch.

This conclusion differs markedly from the findings of the Beach in Wisconsin.

Pullorum infection spreads slowly among adult birds. The extent to which males may be responsible for the spread of the infection is not known.

The mortality in outbreaks among young chicks varies between wide limits. There is little evidence to indicate that efforts to reduce losses have been highly successful. Drugs and chemicals have been found of no benefit when taken into the alimentary tract.

The prevention of losses from pullorum disease lies in removing the sources of infection. Ordinarily these are contaminated incubators, shipping boxes and brooders, infected chicks and carrier hens.

The author regards the agglutination test when properly applied, as being highly ef-

[4] Beach, J. R., and S. T. Michael; Pullorum Disease (Bacillary White Diarrhea of Chickens); University of California, Agricultural Experiment Station Bulletin 486, January 1930.

fective in removing infected adult birds from the flock and thus preventing the perpetuation of the disease through infected eggs.

In a large number of experiments, he found no difference in the efficiency of the slow tube method and the rapid plate method of applying the agglutination test. The cost of the plate method of course is less and the convenience greater. Like others, the author found the blood test recommended by Bunyea far less efficient than either the tube or plate tests.

Infected birds react positively to the agglutination test irregularly and therefore the author believes it necessary to make a number of tests and to remove all birds that react to any test. He considers that five tests of all birds in a flock made at intervals of one month to six weeks, can be depended upon, under ordinary conditions, to remove all or approximately all infected birds, and hold the disease in control. Thereafter, the test should be made annually, and care should be observed not to introduce the disease with new stock or breeding fowl, day old chicks or eggs for hatching.

The author advises beginning these five tests when the chicks are two months old, rather than waiting until the pullets are laying, as has formerly been advised.

At the present time, the systematic application of the agglutination test to breeding fowls, combined with proper management and sanitation in the laying and breeding houses, in the brooder house and in the hatchery provides the most effective and practical means for the prevention and eradication of pullorum disease in adult fowl and chicks.

Pathological Conditions Ascribed to Nematodes in Poultry

Cram[5] discusses nematodes in poultry from a new point of view, beginning with the diseased bird and an attempt to find the parasite responsible. This, of course, is the manner of approach of the practitioner. He is not called to a healthy flock to determine if nematodes be present, as they always are, but to the ailing flock to find the cause of the trouble.

The responsibility for nematodes in the following conditions are discussed:

Injury to the Eyes:

Chickens: Manson's eye worm, *Oxyspirura mansoni* and (in Australia) *O. parvorum,* causes inflammation from slight to very severe resulting in blindness and even destruction of the eye-ball.

Pigeons: Loss of pigmentation of the iris is due to infestation of the glandular stomach with *Dispharynx spiralis.*

Pulmonary Involvement:

Chickens, Pheasants, Quail: The gapeworm, *Syngamus trachea,* causes asphyxiation, from infestation of the trachea.

Geese and Ducks: *Cyathostoma bronchialis, Amidostomum anseris* and *Capillaria contorta* (in ducks only) cause dyspnea; the first from obstruction of the bronchi, the second by infestation of the gizzard and the last by enlargement of the crop.

Cachexia:

Chickens: *Syngamus trachea, Capillaria annulata, Dispharynx spiralis, Streptocara pectinifera, Chielospirura hamulosa, Hartertia gallinarum, Ascaridia lineata, Capillaria retuse* and *C. columbae.*

Geese and Ducks: *Capillaria contorta* (ducks); and *Amidostomum anseris.*

Paralysis:

Chickens: *Ascaridia galli, A. lineata* and *Capillaria retusa.*

Ducks: *Capillaria contorta.*

Diarrhea:

Chickens: *Tetrameres fissispina, Heterakis gallinae,* and *Strongyloides ovium.*

Ducks: *Tetrameres fissispinus.*

Inflammation of Digestive Tract:

In the esophagus, both dilated and undilated portions, local lesions in the form of burrows, surrounded by areas of slight inflammation, may be caused by *Gongylonema ingluvicola* in chickens, by *Capillaria annulata* in chickens, turkeys and quail, and by *C. contorta* in ducks; in the case of capillarid infestations the inflammation may become very severe, with thickening of the

[5] Cram, Eloise B.: Pathological Conditions Ascribed to Nematodes in Poultry; U. S. Department of Agriculture, Circular No. 126, September 1930.

wall as the mucosa becomes catarrhal and later croupous, with sloughing of the membrane. In the glandular stomach a catarrhal condition, with thickening of the wall, may be caused by *Dispharynx spiralis* in chickens and pigeons; by *D. nasuta, Tetrameres fissispina* and *T. americana* in chickens; and by *Amidostomum anseris* and *Echinuria uncinata* in domestic waterfowl. The lining of the gizzard may be destroyed and the muscular wall invaded by *A. anseris* in water birds, and by *Cheilospirura hamulosa* and *Streptocara pectinifera* in chickens.

An enteritis, at times severe, may be caused by species of capillaria (*C. meleagris-gallopavo* and *C. retusa* in chickens and turkeys, *C. columbae* in chickens and pigeons, and *C. collare* in chickens); by species of ascaridia (*A. galli* and *A. Lineata* in chickens and *A. columbae* in pigeons) and by *Hartertia gallinarum* in chickens, all in the small intestine. Severe and sometimes fatal cases of typhlitis are reported as caused by *Heterakis gallinae* and *Strongyloides avium* in chickens.

In the majority, if not in all, of these parasitic infestations of the digestive tract there is more or less tissue invasion at some time in the life history. The immature forms of *Ascaridia lineata* have been shown by Ackert to bury their heads deeply in the intestinal wall, with resultant destruction of the intestinal glands from the tenth to the seventeenth day after the infection is acquired by the chick, the worms thereafter withdrawing to the lumen. *Heterakis gallinae* invades the mucosa of the ceca in a similar manner in the early stages. In other cases, as with *Strongyloides avium* in the ceca, with species of capillaria in the small intestine, and with *Dispharynx spiralis* in the glandular stomach, the adults are to be found in close association with the mucosa, although not actually burrowing to the extent that the species of capillaria in the esophagus or the species of gizzard worms burrow in the wall.

Parasites causing stenosis, occlusion, nodules and tumors, obscure physiological changes and secondary infections also are named in the bulletin.

Flukes in Sheep and Goats

Fascioliasis in sheep and goats has received constant study by the Department of Veterinary Medicine of the Oregon Agricultural College since 1919, and much information on the subject has been collected.

It was discovered [6] that some ova of flukes may hatch in as short a period as 14 days, and that the hatching continues for a period of 13 months and 20 days before it is complete, thus indicating that infested sheep and goats must be kept off an infested range for more than a year before it will be free from the parasites.

Twenty-three different specials of fresh watersnails have been collected and studied. The miracidia were demonstrated to attack a number of these snails but cercariae were found developing only in *Lymnaea* (Galba) *bulimoides* Lea. Cercariae were discharged by these snails for a period of three months and nine days after infestation by the miracidia.

The snail host lives chiefly along the banks of small streams that come down from the hills, and particularly in springs that flow for a short distance and sink into the ground, leaving seepy places on hill sides that are wet the year around.

The flukes were found to extend from sea level to an elevation of at least 5,600 feet, and were not killed when the temperature fell to 40 deg. below zero.

The symptom often given as characteristic of this disease—bottle jaw—edema in the submaxillary space, was found in sheep suffering from all stages of liver fluke development. Another characteristic symptom of immature fluke infestation is pot-belly—ascites. Five gallons of fluid was removed from the abdominal cavity of an averaged size ewe. Black scours, popularly supposed to be characteristic of fluke infestation, is by no means universally present.

As noted by others, sheep often die suddenly in the first stages of infestation when only a few parasites are present. This had led to the belief that death was due to sec-

[6] Shaw, J. N., and B. T. Simms; Studies in Fascioliasis in Oregon Sheep and Goats; Oregon State Agricultural College, Agricultural Experiment Station Bulletin 266, June 1930.

ondary invaders, but the authors were unable to demonstrate that such is the case.

The carbon tetrachloride treatment advocated by Montgomerie was highly successful in the destruction of mature and nearly mature flukes. Animals so far gone with the disease as to be unable to walk, in many instances, showed a surprising improvement in three days after administration of 1cc capsules of carbon tetrachloride.

The authors were unable to learn why some individuals possess a high susceptibility to poisoning from carbon tetrachloride nor did they observe much of this supersensitiveness. However, as a matter of precaution they usually dosed three or four animals in a flock and waited 24 hours to see the outcome before dosing the remainder.

Ducks placed on snail infested pastures seem to keep down the numbers somewhat, but were wholly ineffective in ridding the pastures of snails.

The treatment of infested pastures with one part copper sulphate to eight parts of land-plaster (calcium sulphate) at the rate of 270 pounds of the mixture per acre destroyed from 97% to 100% of the snails in 72 hours. The application was in no way harmful to animals grazed on treated pastures.

Overfeeding—A Disease of Feeder Lambs [7]

This is a description of the ailment in feeder lambs repeatedly discussed in these pages by I. E. Newsom of the Colorado Experiment Station. It is interesting to note that the same condition obtains in feeding feeder lambs in Wisconsin as it does in Colorado, and from the same cause—a ration including too much grain.

Feeder sheep and lambs to the number of about 125,000 are fed in southern Wisconsin for the Chicago market. Unlike Newsom, the author attributes the condition in part to lack of exercise.

The following description of the symptoms quoted from Newsom's work, are said to apply equally well to conditions in Wisconsin:

"The affected animals are almost invariably the largest, fattest, most vigorous, and the greediest lambs in the lot. In a few instances the head is thrown back, the lamb staggers, falls to the ground and dies in convulsions as though from an apoplectic stroke. More commonly, however, lambs live a few hours showing typical cerebral symptoms, such as the head being thrown back or running in a circle or pushing against a fence. In these cases some diarrhea may be shown. In many instances lambs are merely found dead in the morning. In those living still longer some will vomit up grain, which can be seen on the ground of the pens. The lambs stop eating, a diarrhea supervenes and may continue for several days. The animals then rapidly lose weight. In these cases death may occur after several days or the animals may recover. In a few cases lambs become paralyzed, go down and are unable to rise for weeks. If fed and watered these animals can be kept alive for a long time. Occasionally after recovery the affected lambs shed their wool."

Postmortem examination of lambs that had died revealed evidence of a disturbance having taken place in the bowels and stomach. These changes were characteristic of an inflammation and were confined largely to the intestines. In some cases the fourth compartment of the stomach was also involved. Hemorrhagic spots of varying sizes were noted in other organs that have to do with digestion, as well as in the muscles. The kidney lesions, which were accompanied by degenerative changes leading to almost complete destruction of the kidneys and the formation of a pulpy mass, were seldom if ever evident until after the carcass had lain for a time.

Bacteriological examination of tissues of lambs that were killed and from others that had just died failed to reveal a specific organism to which the affection could be attributed. Experimental animals when injected with material from these lambs failed to react, so it is thought the disease is neither contagious nor infectious in nature.

[7] Hadley, F. B., and C. R. Strange; Overfeeding—A Disease of Feeder Lambs; University of Wisconsin, College of Agriculture Stencil Bulletin No. 103, August 1930.

Brucella Abortus a Cause of Hygroma

It is well known that hygroma involving the knee of cattle is a common ailment. This was formerly attributed to trauma occasioned in lying and getting up on unbedded floors or from kneeling while eating from the manger.

However, it has been noted that herds in which infectious abortion is present often suffer from acute arthritis and from hygromata of the pelvic limb. So common is this in some places in Sweden that such hygromata are referred to as "abortion enlargements." It has been shown that the contents of such hygromata react to the agglutination test in a high dilution.

Boyd and associates [8] observed that cows affected with hygromata of the carpus are often positive reactors to the agglutination test for Bang's disease. They also observed that inflammation of the stifle joints of aborting cows is not uncommon. Writers on undulant fever in man state that pain in the joints is a common symptom.

Two cases of carpal hygroma in cows were studied and the presence of *Br. melitensis* var. *abortus* was demonstrated in each case, both microscopically and by inoculation tests.

Bang's Disease in Illinois

An investigation of more than 360 herds comprising approximately 10,600 cattle in 68 counties in Illinois has indicated that 20% of the animals were infected with Bang's disease. There are a million cows and heifers more than two years old in the state. If this percentage of infection obtains in all of them, the loss to the cattle industry of the state from this disease exceeds $10,000,000 annually.

Twenty-one infected herds have already been freed from infection by a plan essentially similar to the Pennsylvania plan, and experience has shown that, though the plan is not perfect, the disease can be successfully eradicated from herds by it.

Graham and associates,[9] in a bulletin intended for dairymen, follow the familiar question and answer plan, a plan objectionable both for the reason that it lacks continuity and that the questions asked seldom include the things or all of the things that the reader wants to know.

The bulletin contributes the names "Brucella Bang" and "Brucella Traum" to the confusion that already exists in the nomenclature of the organism under discussion.

It is stated that the slow (tube) method and the rapid (plate) method of making the agglutination test are equally reliable. It is stated that "At the present time vaccines should be regarded at best as experimental."

Among the causes of abortion other than infection with the *Brucella abortus,* the following are given: *Vibrio fetus,* aspergillus, *B. pyogenes,* avian tubercle bacillus, mucor species, *Strept. alpha* and *gamma.* Other pus producing organisms, poisonous plants, falls, kicks, crowding, moldy feed and cold drinking water, are stated to constitute but a small percentage of the total number of abortions. The legendary cause of the presence of a woman during her menstrual flow is omitted, although it probably is no less important than mold on the feed or cold drinking water. But seriously it seems the time has arrived—if it did not arrive some time ago—when we should revise the causes of abortion in cattle as listed by James White more than 100 years ago in his "Dictionary of the Veterinary Art" (1817). The vast amount of research that this subject has received in the last decade merits more consideration at the hands of many writers on veterinary subjects than it is given. The Illinois bulletin referred to is by no means alone in endeavoring to perpetuate in the minds of cattle raisers the notion that crowding, cold drinking water, fright, moldy feed and a dozen other things, real or imaginary, *may* be the cause of a storm of abortion in his herd. Painful as the process may be, it is better to tell the herd owner the probable truth and omit the sugar coating. It will save disappointment when his new tank heater fails to eliminate his breeding troubles. There are

[8] Boyd, W. L., A. L. Delez and C. P. Fitch; The Association of Bacterium Abortus Bang with Hygroma of the Knee of Cattle; Minnesota Agricultural Experiment Station; Journal Series Paper No. 947.

[9] Graham, Robert, and Frank Thorp, Jr.; Answers to Questions Regarding Bovine Infectious Abortion; University of Illinois, College of Agriculture and Agricultural Experiment Station Circular 360.

frequent abortions in cows that, so far as we know, are not due to the Bang organisms, perhaps not due to any infection. If it is not compatible with our pretentions to say we don't know, it is suggested that some agency that will not occasion the dairyman unnecessary expense to remove be named in such cases. Perhaps biologic compensatory reactions or the doctrine of atonement would serve until the problem is further elucidated.

No Visible Lesion Reactors

The entire cattle population of Wisconsin, approximating 2,500,000 in number, has been tuberculin tested. All of the cattle in some counties have been tested four times during the past twelve years. Three million animals were tested from July 1, 1927, to July 30, 1929.

The tuberculin test has shown its value by the rapidity with which the incidence of the disease has been reduced. Approximately 46% of the cattle in one county in Wisconsin were found tuberculous on the first examination. Four years later the incidence of the disease was less than .05%. In another county, 465 infected herds were discovered on the original test, and on a test six months later, but 20 of those herds revealed any reactors, and in a third test six months after the second, but one herd had a reacting animal, and on a fourth test, the entire county was clear. Another county containing 34,000 cattle was practically free from tuberculosis in two years.

From this and other experiences it can be said that the failure of tuberculous cattle to react to the test does not present a serious problem. The other possible error in the test involves the positive reaction of nontuberculous cattle. During the entire history of tuberculin testing, animals have reacted in which it has not been possible to demonstrate lesions. In Wisconsin, such animals have made up one-seventh of all the reacting cattle in the past decade.

Three groups of possible false reactors to the tuberculin test should be considered. The first group consists of those animals in which no apparent reason can be found for reaction to the test (no lesion cases). The second group includes those animals which show areas beneath the skin, especially of the legs, which have been classed as tuberculous skin lesions. A third group possibly includes those animals showing lesions which in gross appearance are tuberculous, but which may be due to some microorganism other than the tubercle bacillus.

The explanation of the true no lesion reactors has been that it is sensitized to tuberculin by the growth of the tubercle bacillus in its tissues, the lesions being too minute to be discovered in the cursory examination possible in the ordinary routine of the abattoir. The Federal Bureau of Animal Industry subjected to detailed laboratory examination the tissues most likely to be tuberculous from 4,355 such "no lesion" cattle. The examination revealed evidence of tuberculosis in 935 cases or 22% of the whole. It seems fair to conclude that some part of the 2,420 no lesion reactors were not tuberculous, but that they had been sensitized to tuberculin by some agent other than the tubercle bacillus.

Microscopic examination of the skin lesions has been consistently positive as to the presence of acid fast bacilli and on cultures and animal inoculation trials has been as consistently negative. The preponderance of evidence is against the skin lesions being tuberculous.

The study of the organs [10] of both no lesion and skin lesion reactors led the author to believe that some agent other than the tubercle bacillus might have caused the sensitization that resulted in the reaction.

The results of the trials leave many questions unanswered, but the author believes that they establish beyond question the ability of certain bacteria other than the tubercle bacillus to sensitize cattle to mammalian tuberculin.

It was necessary in the beginning of the eradication movement to consider every reacting animal as a tuberculous one. It seems proper now to ask whether this practice should be continued. As herds are re-

[10] Hastings, E. G., B. A. Beach and Isabel Thompson; The Sensitization of Cattle to Tuberculin by Other Than Tubercle Bacilli; American Review of Tuberculosis; Vol. XXII, No. 2, August, 1930.

peatedly subjected to examination, a history is established as to their freedom from tuberculosis. The author believes it will be found advantageous to use such data to supplement the tuberculin test. The authors state that many examples of the value of this plan could be cited.

Soil Disinfection

All recent sanitary teaching emphasizes the importance of environmental infection not only in the general parasitisms where the environment of the animal has for some time been looked upon as the principal source of infection, but also in a number of the most important infectious diseases, including tuberculosis, Bang's disease, swine pest (infectious necrotic enteritis), Pullorum disease, coccidiosis and some others, including the whole group of filth borne diseases.

The standard rule of course, for the prevention of disease and parasitisms due principally to environmental infection is to put the animals on clean ground, to rear the young on ground to which the adult animals of the same species have not had access to for a period of months or years. This method is effective where carried out. In too many cases, it is not a practical measure in the system of farm management under which these diseases must be combated.

The desirability of an economical and at the same time effective soil disinfectant is thus obvious. Allen and Jacob [11] undertook a study of this problem as it applies to pullorum disease in chickens.

In the study of the adaptability of standard disinfectants for use on poultry yard soil, cresole solution U. S. P. was found to be the most efficient, but cost is prohibitive. A search was made for cheaper materials and one was found in sodium acid sulphate ($NaHSO_4$) "niter cake," a byproduct in the manufacture of nitric acid. A 2.5% solution of this salt applied at the rate of one gallon per square foot of surface to be disinfected, was found effective at a low cost for material and for labor of application.

However, as a safety precaution the authors advise using the solution in 5% strength, that is at approximately one-half pound of the salt to a gallon of water.

In the experiment, adult hens were used and confined on ground in poultry lots untreated and on ground on which a million *S. pullorum* organisms were sown, to each square foot of surface. All of the birds contracted the disease in four months on the artificially infected ground. Half of those contracted it on treated ground, presumably naturally infected, and no bird contracted the disease on the artificially infected ground to which the sodium acid sulphate solution had been applied.

Within the conditions of this experiment, complete protection was afforded poultry against *S. pullorum* contaminated soil by disinfection with a 5% solution of sodium acid sulphate. The ground was later sown to rye grass, which grew as luxuriantly as on untreated ground. It was therefore concluded that a single application of disinfectant does not affect the crop-producing quality of the soil.

The birds on the disinfected soil were healthier than the others and increased more rapidly in weight. The prompt infection of all birds on the artificially infected ground was a surprise. It has been believed heretofore that pullorum infection extended but slowly among adult birds. In fact, other experiments have shown that many adult birds will not contract pullorum disease from infected birds even when maintained in the closest cohabitation, and those that do contract the disease, contract it only after an extended period, in most instances twice the length of the period of this experiment. The explanation for this discrepancy in the results of different experiments is not obvious, but may lie in the greater density of infection on the artificially infected plots. If such be the case, it is just another evidence that the environment is of greater importance in the spread of pullorum disease than the infected bird.

[11] Allen, P. W., and M. Jacob; Sodium Acid Sulphate as a Disinfectant Against Salmonella Pullorum in Poultry-Yard Soils; University of Tennessee Agricultural Experiment Station, Knoxville, Tenn., Bulletin No. 143; September 1930.